AN INDUSTRIAL PUBLISHING CORPORATION MAGAZINE

DECEMBER, 1958

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ANN ARBOR MICH
PIZ

Precision Metal Molding

PMM

INCLUDING DIE CASTINGS MAGAZINE

DISTILLED EDITING

DIE CASTINGS

EXTRUSIONS

INVESTMENT CASTINGS

ERMANENT MOLD CASTINGS

PLASTER MOLD CASTINGS

POWDER METALLURGY

SHELL MOLD CASTINGS

To buy them or to make them, that is the question.

See Page 3

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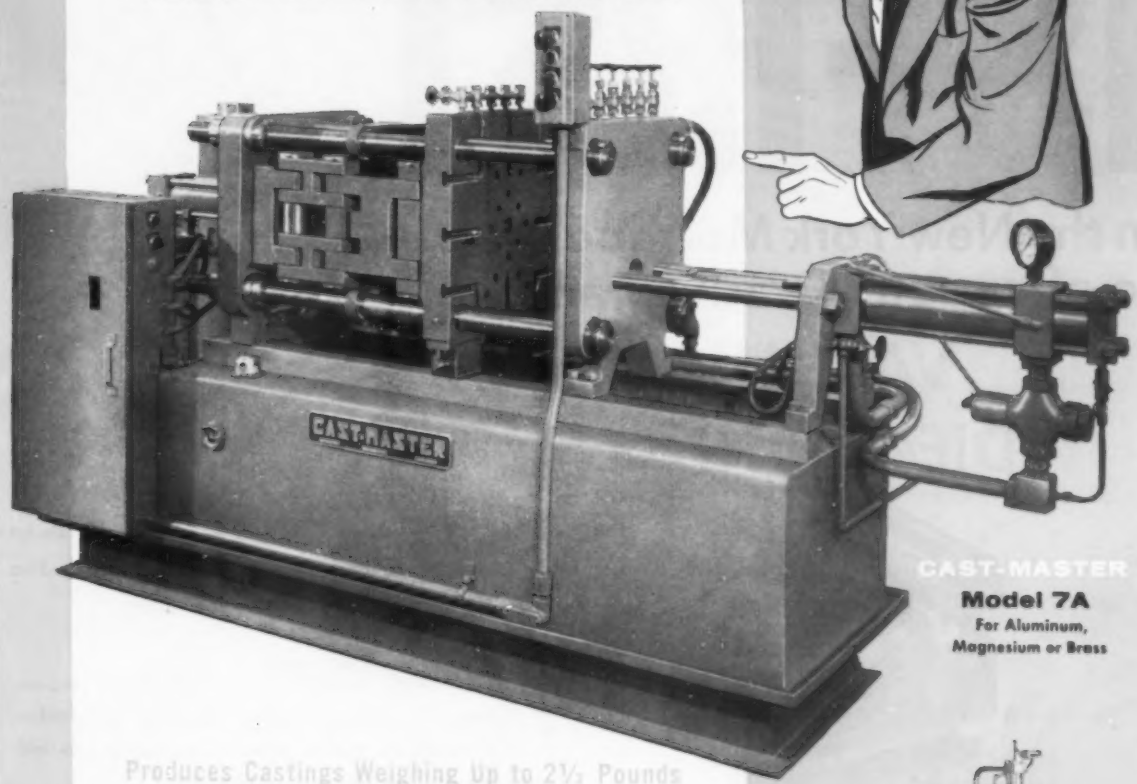

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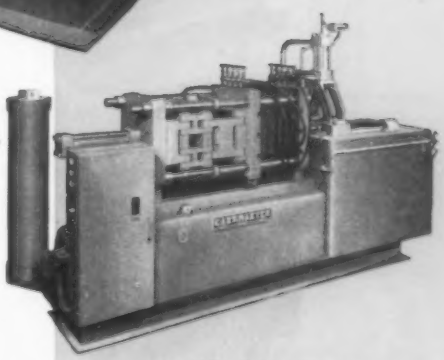
Model 7A
For Aluminum, Magnesium or Brass

Produces Castings Weighing Up to 2½ Pounds

Great news for producers of small castings! Now you can get *quick, direct-from-stock delivery* on two new Cast-Master Die Casting Machines: Model 7Z for Zinc, Tin, Lead — Model 7A for Aluminum, Magnesium, Brass. Both feature the same outstanding design and rugged construction of the larger models now operating in America's leading plants. That means solid steel platens, extra heavy linkage with multiple shear points, and many other details that make possible safer, high-speed production of mirror-smooth, hardware-finish castings.



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For Zinc, Tin and Lead

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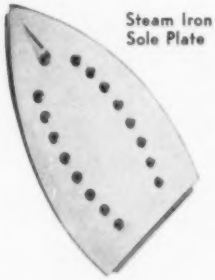

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Premier . . . will design and engineer to your specifications. Customer satisfaction is first with us, and to prove it, we furnish you with quality castings to your requirements.

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*BENEFITS OF VACUUM DIE CASTING

1. Thinner Wall Sections — Wall thickness can be reduced by 25%.
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SEND FOR LITERATURE AND FURTHER DETAILS

Premier DIE CASTING COMPANY

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COVER

TO MAKE OR BUY die castings is often a problem. Generally it looks like a saving to make them for your own use. Too often there are hidden or unexpected cost items that a more complete accounting show up—then the apparent saving is gone. David Laine, secretary of the American Die Casting Institute has studied this problem for many years. His article, beginning on page 27 points out most of the questions that must be answered before you can be sure that to make is a saving.

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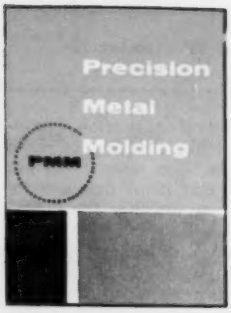

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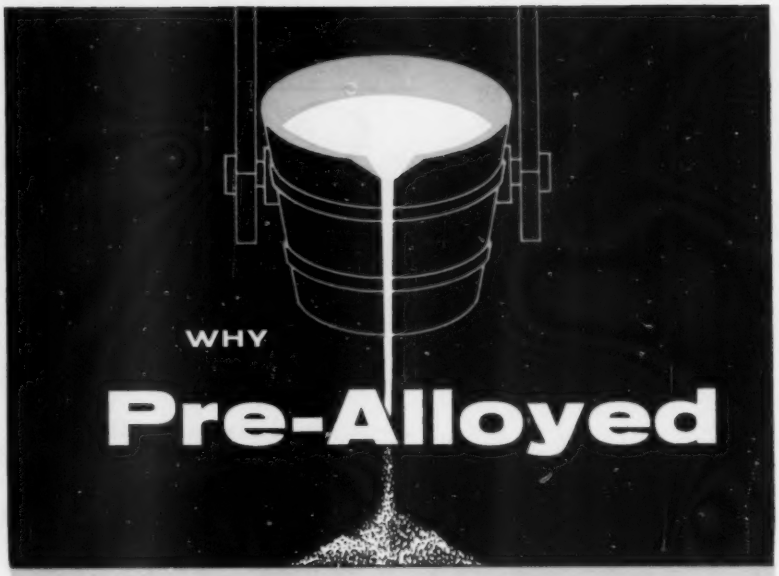

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1 composition

Produced from molten metal of required analysis, *each Vasco pre-alloyed powder particle has the composition of the entire melt*—each is a tiny alloy ingot. Any part made from our *pre-alloyed* metal powders has the same homogeneous properties as the identical analysis in bar or cast form, within density limitations . . . giving unequalled strength or corrosion resistance.

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VASCO *pre-alloyed* metal powders can be produced in any analysis up to melting points of 3000°F., including chrome-nickel stainless, chromium stainless, low alloy structural, nickel and silicon iron, hard facing alloys, nickel-copper and nickel-chromium iron alloys, special corrosion and high temperature resistant alloys, and tool steels.

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Standard powders are available from stock, including Types 304 and 316 stainless, and Vasco 4630A (AISI 4630) alloy steel. This basic nickel-moly analysis is also produced in other carbon contents from .10 to 1.50%. Many special powders are also available from stock in limited quantities. Prompt deliveries of both standard and experimental powder quantities are made from our Latrobe, Pa. plant. *Send us your inquiries.*

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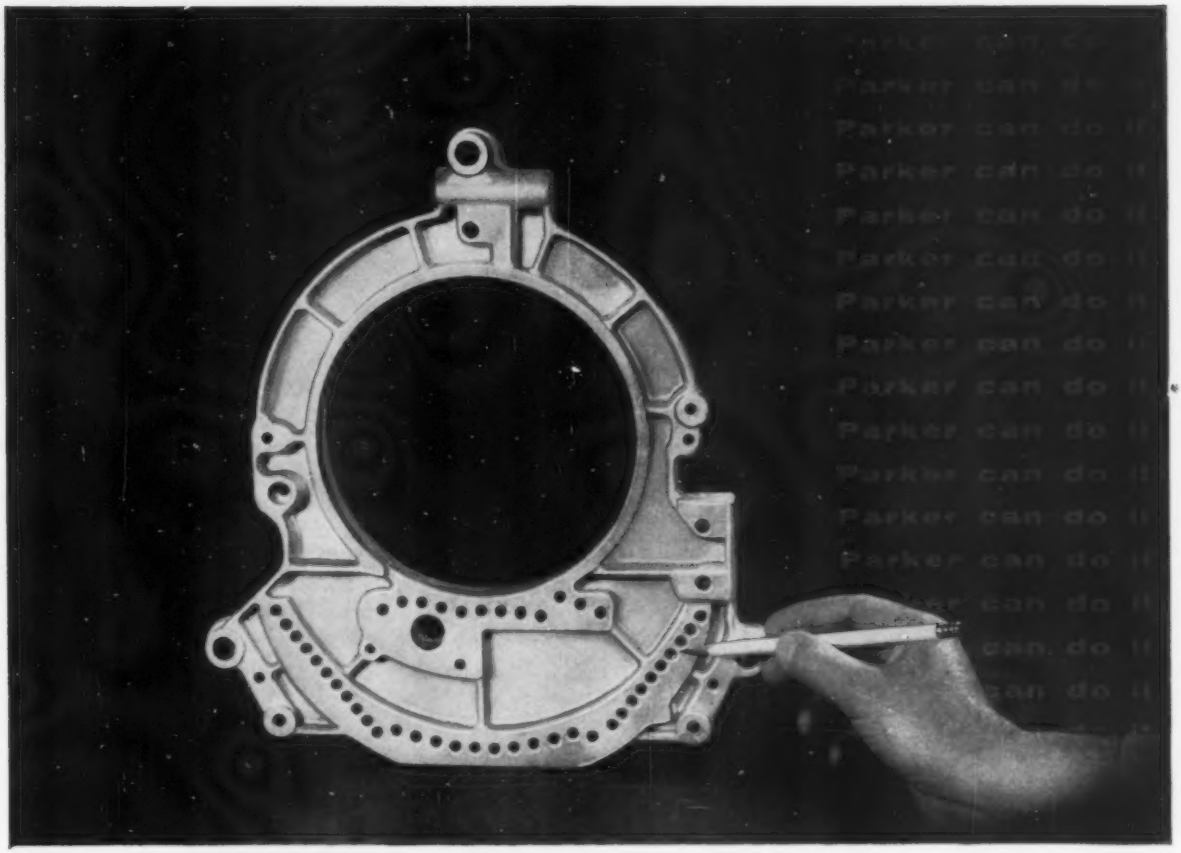

The WHOLE Story Of Die Casting Savings

These close tolerance holes could have cost more than the part itself. Actually, *they cost practically nothing!* Parker-engineered die casting makes the difference. By means of precision coring, the holes are cast to exact diameter and location . . . a bonus in the low unit cost of producing the complete part. Just think of the savings compared with other production methods requiring finish machining.

The creative engineering approach that made these savings possible has been the hallmark of Parker service since 1906. It is the plus factor that is never figured into a Parker estimate. If you are a Parker customer, you know this is so. If you are not, you can profitably prove it to yourself by consulting the nearest Parker sales engineer on your next component part requirement.

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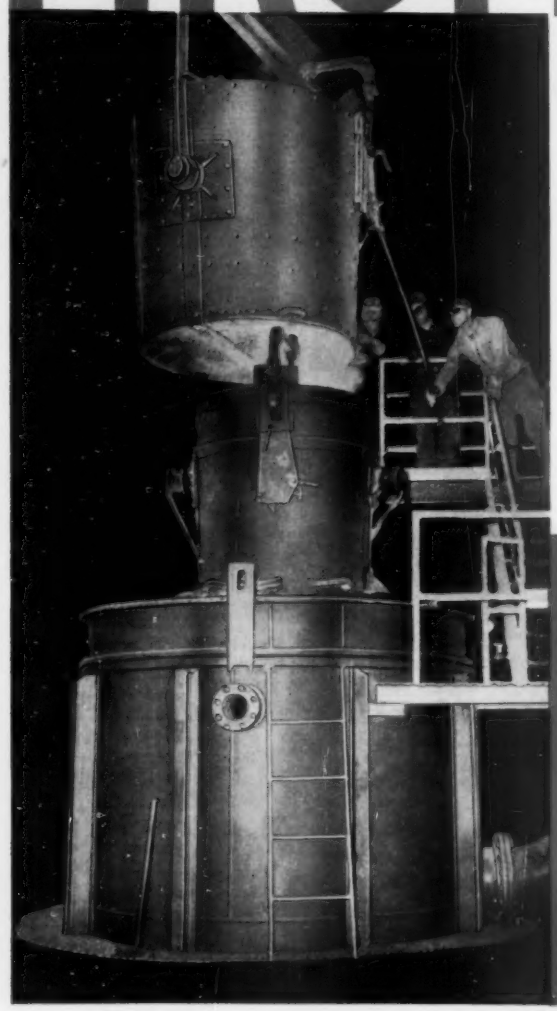
FIRST with VACUUM DEGASSING in die casting die steels THERMOLD AV



For your most exacting die casting jobs, Thermold AV gives you the assurance of highest quality by the use of the ultimate in melting technique—vacuum degassing.

Now large size ingots are vacuum degassed in standard production processing—the first tool steel degassing installation in the United States.

This new advantage is in addition to quality controls that have set the standard for the industry—small batch furnace melting, close control of press forging and annealing, and 100% Reflectoscope testing.

With this contribution to the high quality of Thermold AV, Universal-Cyclops gives further assurance of homogeneity of structure, freedom from gaseous impurities, high polishing quality and the utmost resistance to thermal and mechanical fatigue.

Write for new bulletin.

A heat of Thermold AV being processed in the vacuum degassing installation.

A block of Thermold AV measuring 18" x 36" x 48". One of the largest forged blocks of high alloy die casting die steel ever produced—typical of sizes available vacuum degassed.

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STEEL CORPORATION
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TOOL STEELS • STAINLESS STEELS • HIGH TEMPERATURE METALS

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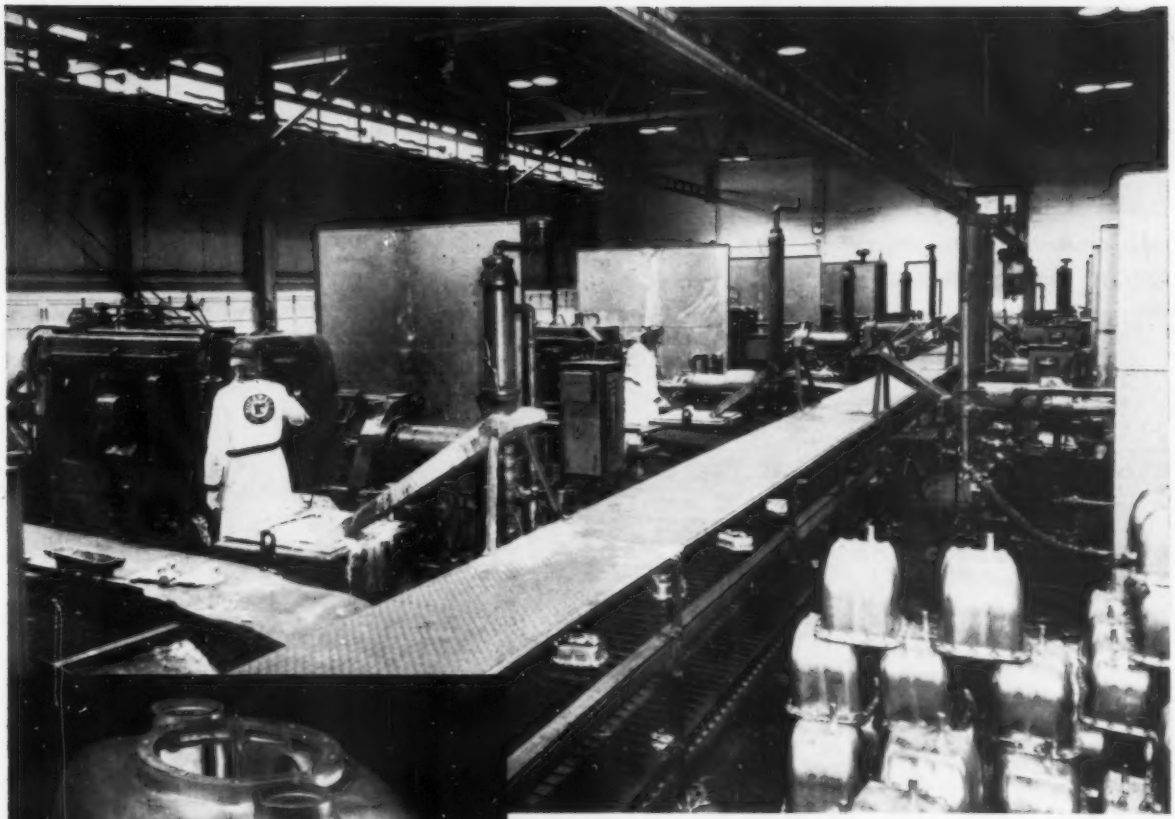

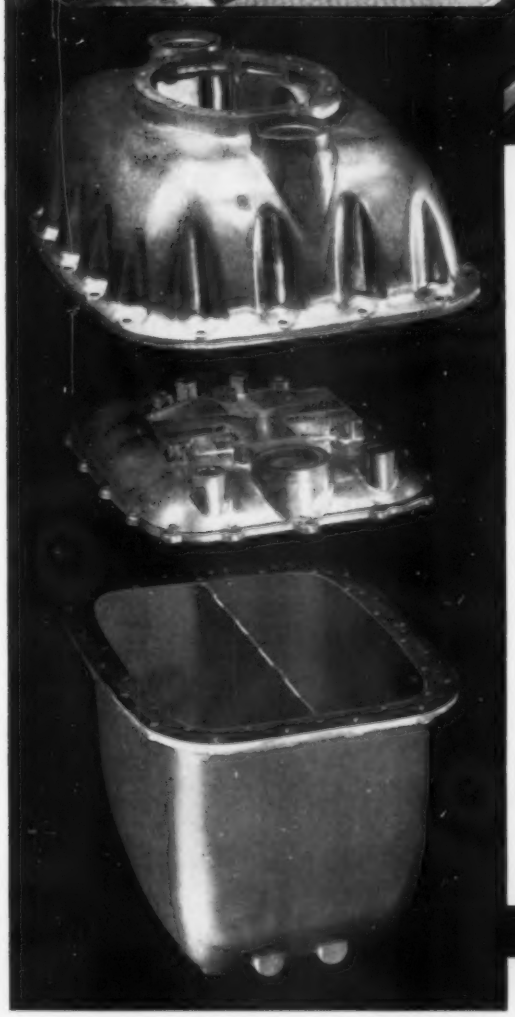

"LESTERS take the human element out of die casting operations"

Since aluminum meter die castings must be pressure proof and free of porosity and of a special alloy, Rockwell Manufacturing Company had a problem to secure high grade castings in production quantities. This was especially true of the Rockwell 700-800 Gas Meter parts (shown at left) which were very difficult to cast. One part alone weighs 16 lbs. 12 oz., machined—measures 13-1/2″ x 16″ x 12-11/16″ deep—and is required to stand 40 lbs. of air pressure under water at 110 degrees.

This part is now produced by a $23,000 die run in an 800 ton Lester Machine with a 30″ die movement, automatically ladled, at Rockwell's Plant in Russellville, Kentucky.

It is the opinion of Jack Whipple, Die Cast Supt. at the Russellville Division of Rockwell Manufacturing Company, that with the speed and pressure you get from a Lester Machine, it is possible to eliminate a lot of human error in die casting. Therefore, it takes less experienced operators to produce the high quality necessary for Rockwell products.

Rockwell is operating 19 Lester Die Casting Machines at its 106,000 sq. ft. air conditioned Die Cast Plant at Russellville.

If you are interested in making quality die castings, write for complete information on Lester Die Casting Machines.

LESTER-PHOENIX, INC.

2708-E CHURCH AVENUE • CLEVELAND 13, OHIO

Agents in principal cities throughout the world

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Reserves are only part of the reason why Canada produces more than eighty per cent of the free world's nickel. More important than the reserves are the Canadians themselves. For Canada has bred a group of men who have made mining their lives. Men who spend their days and nights wresting ore from the earth and metal from the ore.

These are the men who have made Sherritt Gordon Mines Limited the third largest nickel producer in Canada. For them, mining was always a full time job. First copper mining, then nickel mining. Now they are blazing a trail in nickel refining. A new revolutionary process, developed by Sherritt, has captured the imagination of metals people the world over. And as the need for nickel has grown, so have the men of Sherritt expanded their facilities to meet it.

By adding a third skill to mining and refining, Sherritt enters a new era of growth and service. On September 1, 1958, Sherritt named Foote Mineral Company the sole sales agent for Sherritt nickel in the United States and Canada.

SHERRITT

nic

mined by SHERRITT

As Sherritt typifies the determination and devotion of the Canadian miner, so Foote typifies the concept of imaginative service of the American technical marketer.

Foote's entire history has been marked by a deep understanding and familiarity with the earth sciences. But going beyond mere understanding, Foote has used its knowledge to help customers expand the known markets. And entirely new markets have been opened for such materials as lithium and manganese.

The reputation won by Foote in the creative marketing of metals, minerals, and chemicals has now secured for Foote a new challenge . . . the exclusive sales agency for Sherritt nickel in the United States and Canada.

If you use nickel now . . . or if there's a promise that nickel might prove useful to you in the future . . . get in touch with Foote Mineral Company, 474 Eighteen West Chelten Building, Philadelphia 44, Pa.

kel

marketed by FOOTE

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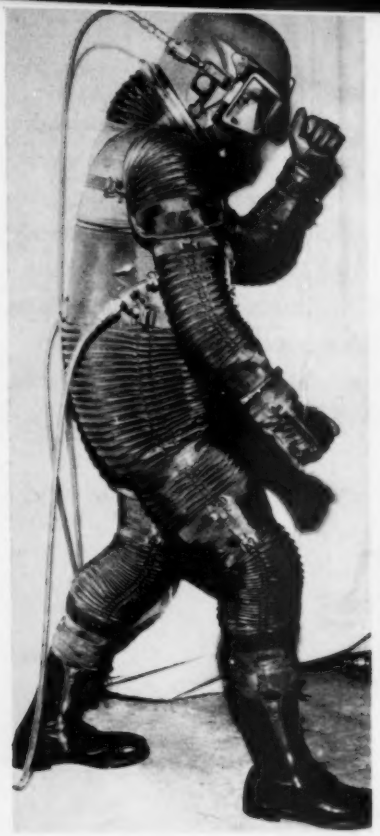
CASTING ABOUT

technical news of applications & processes involving precision metal moldings



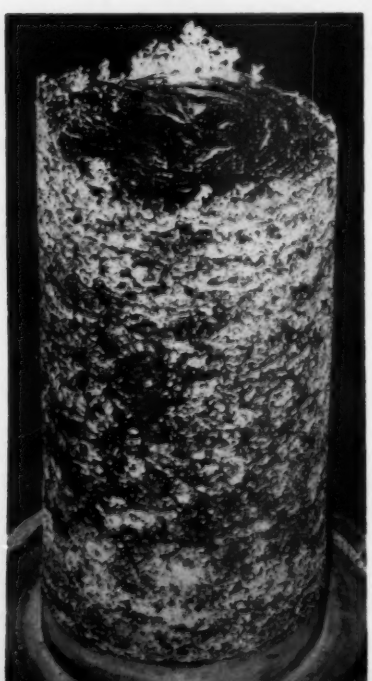
NOT BUCK ROGERS, but what the well dressed man will wear to work in the atmosphere controlled areas of a new plant which will be built by Universal-Cyclops Steel Corp. for the fabrication of the refractory metals.

High speed aircraft, missiles and rockets have created a demand for metals which can operate at temperatures where iron, nickel and cobalt-base alloys are molten. Both tungsten and molybdenum are ideally suited for these applications, but at hot-working temperatures (that is hot rolling and forging) the rate of oxidation is so great, and penetration of ozide into the metal so far that the fabricated products are virtually useless. The answer is fabrication in an oxygen-free atmosphere.

The new plant is designed to melt and fabricate molybdenum. The ingots will be melted in a consumable electrode vacuum arc furnace, then forged and rolled.

Hot working has to be done at temperatures up to 4000° F. by an automatically manipulated impactor and rolling mill. Products will be sheet and bar stock. Personnel will work in the room as observers and will perform minor operations not conveniently adapted to automation. They will be clothed in air tight, air-conditioned suits equipped with air intake and exhaust lines connected to manifolds within the room.

A COLUMBIUM INGOT, the largest thus far made, was recently melted in a consumable electrode vacuum arc furnace. The ingot is 9 in. diameter and 19 in. long; it weighs 330 lbs. The ingot was produced from columbium metal roundels made by Electro Metallurgical Co. Because of its medium density, high temperature strength and low nuclear cross-section, columbium is of interest in nuclear and high-temperature fields.



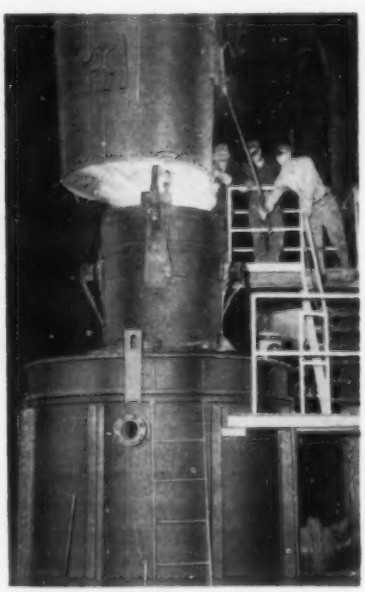
GET ACQUAINTED with extrusions through this handful of extruded aluminum shapes offered by Midwest Aluminum Corp. It's a kit intended to suggest to the product designer some new and different uses of extrusions, possible production short-cuts, product simplification and attachment with a minimum of fasteners.

The kit isn't intended to show a full line of products or all possible shapes. Rather it allows the designer to get the "feel" of aluminum extrusions and to see how they look in three dimensions.

Dimensions of the samples range up to 3" on a side. The maximum are shapes that will fit inside a 3" circle. Solid and hollow shapes are included.

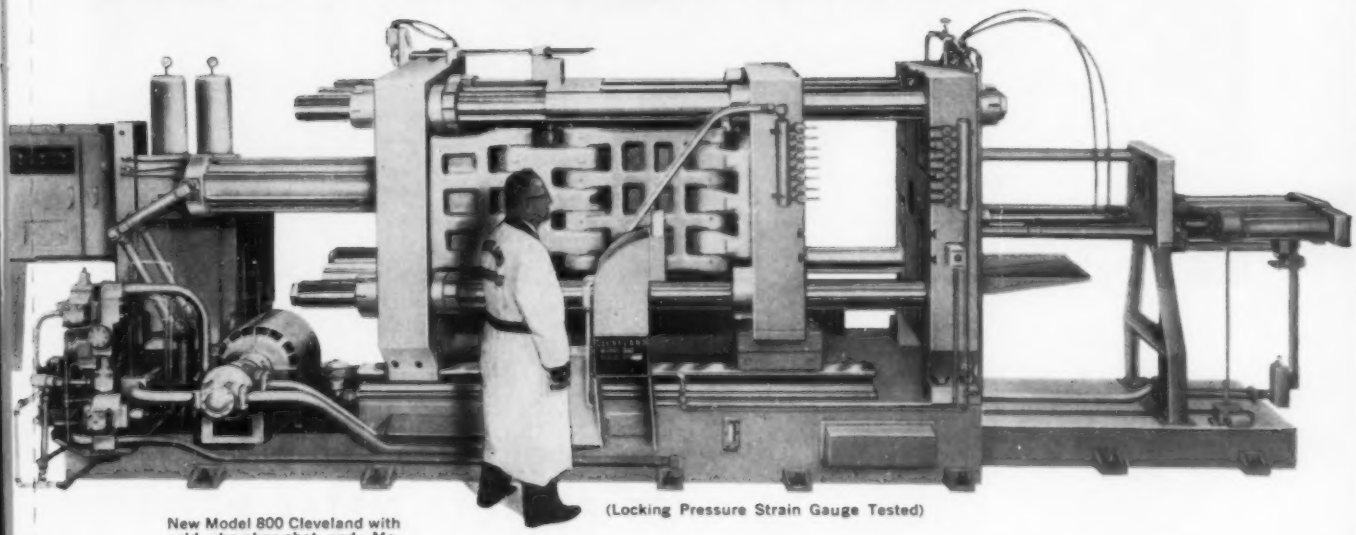
The designer should remember that various shapes can often be combined into a single extrusion to save the cost of joining operations.

A letter to PRECISION METAL MOULDING will bring the kit to you.



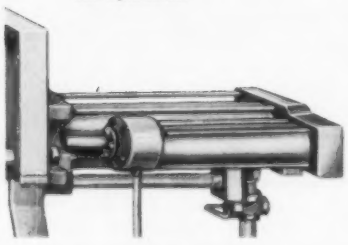
DIE CASTING DIE STEELS with improved properties may result from the use of vacuum-stream degassing of the steel when it is poured. Equipment for vacuum degassing of all large ingots of hot work steel has been installed by Universal-Cyclops Steel Corp. This technique improves homogeneity, removes gaseous impurities and gives better polishing quality to the steel.

NEW 800 TON CLEVELAND Hydraulic Die Casting Machine



(Locking Pressure Strain Gauge Tested)

New Model 800 Cleveland with cold chamber shot end. Machine weight is 28¼ tons. Readily converts to hot chamber operation.



Incorporating an intensifier, new Cleveland cold chamber shot end provides high pressures on metal; high plunger speeds (both adjustable).

Now available for producing castings up to 20 lbs. aluminum, 46 lbs. zinc. This *big*, newest Cleveland has 55″ x 54″ die plates; 33″ x 33″ space between tie bars; 38″ max. to 20″ min. die thickness; 15″ to 24″ die opening. Massive toggle system, with 7″ dia. tie bars and cross head guide bars, 9½″ thick platens, insures extreme rigidity and positive die alignment . . . with *guaranteed* 800-ton locking pressure!

A highly advanced design of cold chamber shot end, incorporating an *intensifier*, assures top-quality, dense castings. Shot plunger speed, after its initial slow, forward movement, can be adjusted to attain any speed up to 500 f.p.m. At any predetermined plunger position, the shot intensifier can be activated to generate plunger pressures up to 20,000 p.s.i. Intensifier pressure is also adjustable. Throughout, the new Model 800 is *Cleveland-engineered* to give you highest casting quality with utmost reliability of machine performance. Call in a Cleveland sales engineer, or write direct, for machine specifications.

Remember, Clevelands Cut Costs!

THE CLEVELAND AUTOMATIC MACHINE COMPANY

4952 Beech Street
Cincinnati 12, Ohio

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Manufacturers of a Complete Line of Single Spindle Automatic Screw Machines and High Pressure Hydraulic Die Casting Machines

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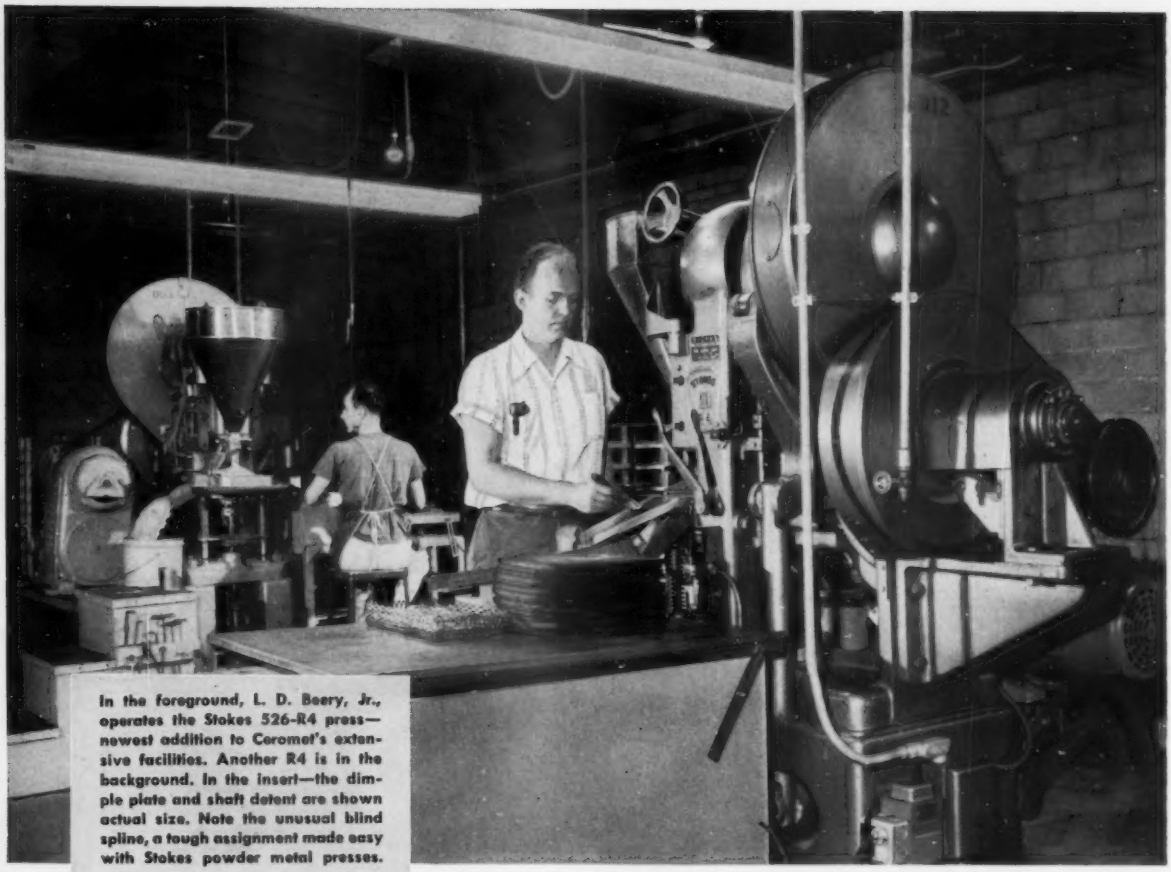
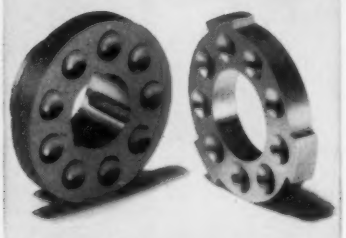


In the foreground, L. D. Beery, Jr., operates the Stokes 526-R4 press—newest addition to Ceromet's extensive facilities. Another R4 is in the background. In the insert—the dimple plate and shaft detent are shown actual size. Note the unusual blind spline, a tough assignment made easy with Stokes powder metal presses.



CEROMET INC., cuts precision tool parts costs 60% with STOKES POWDER METAL PRESSES

Ceromet Inc., La Puente, California manufacturer of powdered metal products, makes dimple plates and shaft detents for a major West Coast precision tool company. The combination of sintered metal and Stokes compacting presses were chosen for this job to provide fast, economical production of quality, close-tolerance parts. Both pieces are produced at the rate of 25 per minute, sintered in a dissociated ammonia atmosphere, and case hardened .020″ in a carbo-nitriding furnace.

Stokes industrial compacting presses produce these parts at an estimated 60% cost reduction over machining—make possible the production of efficient designs not even possible by older and costlier methods. The reproducibility of dimensional control is within 1%—thanks to powder metallurgy techniques and Stokes precision equipment.

Stokes Engineering Advisory Service will be glad to consult on your specific powder metal applications—to help design parts, punches and dies, or complete production facilities. Additional technical information on the entire Stokes line of industrial compacting presses will be sent you on request.

Powder Metal Press Division
F. J. STOKES CORPORATION
5500 Tabor Road, Philadelphia 20, Pa.

STOKES

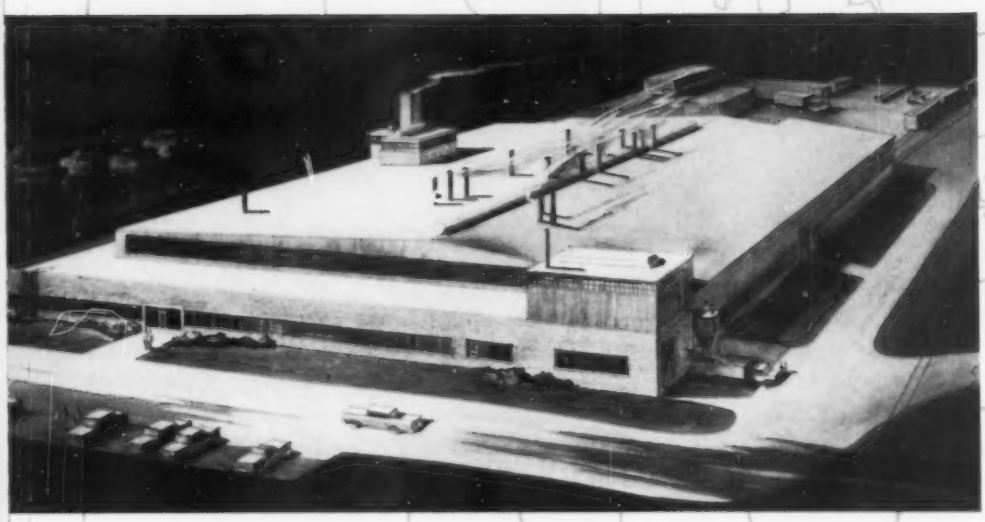
For more information circle No. 44 on the Reader Service Card

Now producing . . . Federated quality aluminum casting alloys from the world's most modern aluminum smelter. New convenience, faster service from the new Alton, Illinois plant and the same rigid quality controls that distinguish all Federated products. This modern smelter can produce every specification of aluminum alloy. And Federated field metallurgists back up every shipment of Alton aluminum ingot with on-the-spot assistance based on long experience. For a broad choice of aluminum casting alloys, call your nearest Federated sales office. There are 23 of them to serve you promptly. Federated Metals Division, 120 Broadway, New York 5. In Canada: Federated Metals Canada, Ltd., Toronto and Montreal.

FEDERATED METALS DIVISION OF

ASARCO

AMERICAN SMELTING AND REFINING COMPANY



For more information circle No. 16 on the Reader Service Card

FOR *Accurate Parts and Faster Assembly*

ZINC DIE CASTINGS ARE BEST

20 YEARS OF SUCCESSFUL EXPERIENCE with ***ZAMAK*** alloy die castings have led Neptune Meter Company engineers to use 40 or more such parts in some models of their AUTO-STOP PRINT-O-METER REGISTER.

This direct-reading register for liquid meters is a perfect example of complexity made simple by the use of pressure-cast zinc alloy. Notice the many as-cast features in these parts: bosses, studs, cored holes, lettering, strengthening ribs and even inserts of other materials cast in place. These parts are ready for assembly with a minimum of machining, and at a saving of production costs.

These assembly advantages resulted from intelligent design. They can be adapted for your products as well — along with the natural durability and corrosion resistance of ***HORSE HEAD® ZAMAK*** die casting alloys.

HORSE HEAD® SPECIAL ZINC AND HORSE HEAD ZAMAK ARE PRODUCED BY

THE NEW JERSEY ZINC COMPANY

DEVELOPERS OF THE ONLY STANDARD ZINC DIE CASTING ALLOYS IN USE TODAY

160 Front Street • New York 38, N. Y.

HORSE HEAD PRODUCTS ®

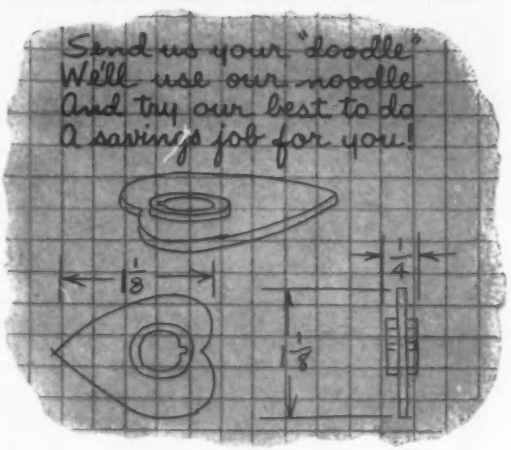
For more information circle No. 41 on the Reader Service Card

Powder metallurgy cuts parts costs up to 75% for manufacturers of products like these

Why not find out now if powder metallurgy holds the answer to your high parts costs?

Send Glidden a sketch of any part, plus the quantity desired. Glidden, with the help of qualified parts fabricators in your area, will determine, first, whether the part can be made with metal powder. If it can, you will receive cost quotations that may show really worthwhile savings—similar to savings realized by an increasing number of manufacturers who have found that metal powder parts can be mass-produced faster, better, more economically.

As a leading supplier of metal powders, Glidden works closely with parts producers. In this way, several staffs of experienced technicians may be at your disposal—to provide complete technical service and suggest possible design changes that may bring even lower parts costs.



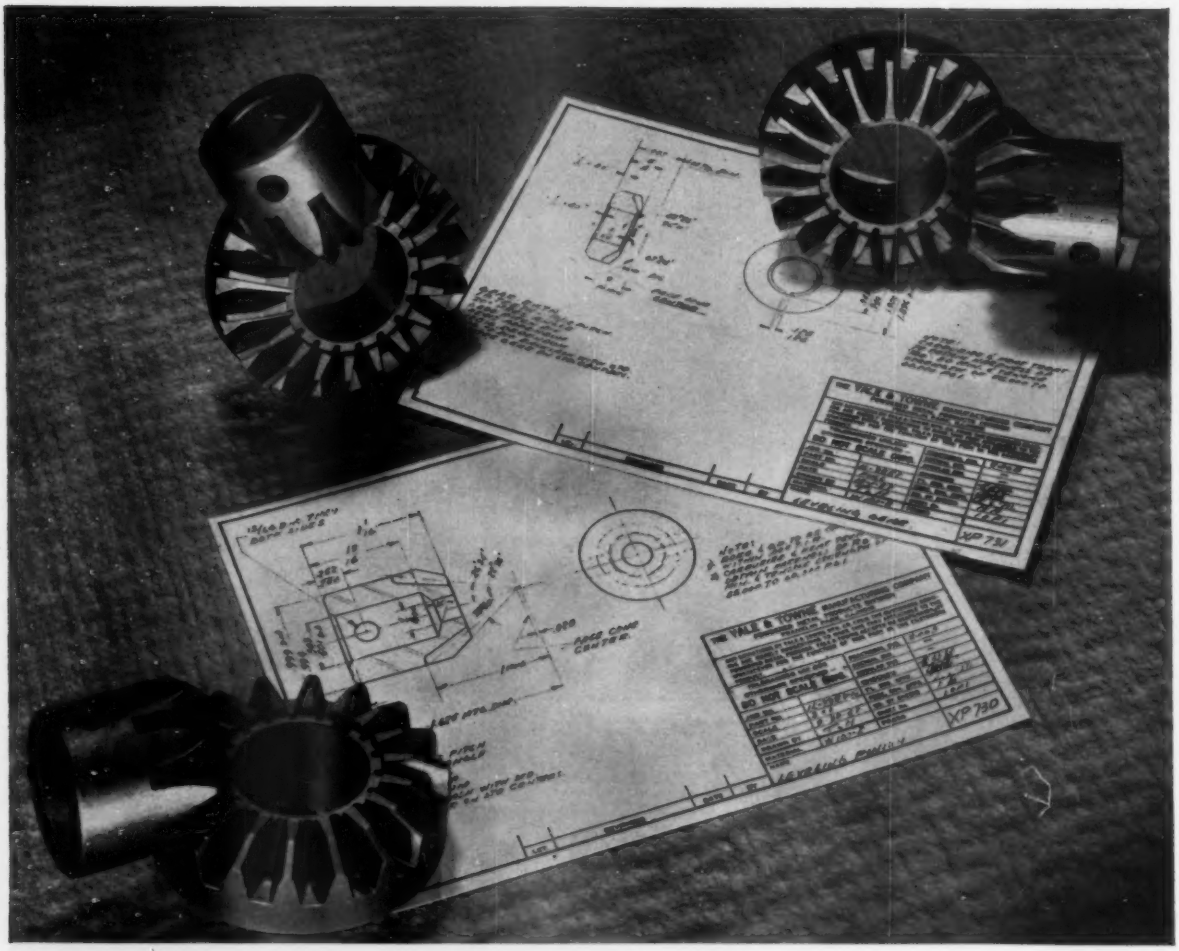
QUALITY Glidden PRODUCTS

RESISTOX METAL POWDERS

The Glidden Company
Chemicals—Pigments—Metals Division
Hammond, Indiana

COPPER POWDER • LEAD POWDER • TIN POWDER • BRASS POWDER • ALLOY POWDER • FILTER POWDER
CUPRIC OXIDE • CUPROUS SULFIDE • CUBOND COPPER BRAZING PASTE • COPPER PIGMENT

For more information circle No. 17 on the Reader Service Card



"HOEGANAES Sponge Iron Powders meet and maintain our most demanding dimensional and physical specifications"

—states AMERICAN POWDERED METALS, INC.

". . . the high physicals required by these powdered-iron (non-ferrous impregnated) pinions and gears *makes the use of Hoeganaes Sponge Iron*, as manufacturing skeletal material, *an asset*.

"Hoeganaes Ancor MH/100 Iron Powder plays a very vital part in meeting and maintaining the most demanding dimensional and physical specifications of these tractor applications.

"*Long run uniformity is fully assured.*"

Such outstanding production performance statement regarding HSIC Ancor MH/100 Iron Powder, directly quotes Henry S. Shroka, Manager of the Powder Metals Division of the American Powdered Metals, Inc.

And *long run uniformity*, as well as *rigid specifications control*, can also be added to your powder-metallurgy parts production program.

Here's a good start: simply request the services of the HSIC Engineering Specialist. You'll find that his time-tested experience in helping to develop many productive results, like the American Powdered Metals facts, can be put to work for you, too. His services are available to you today.

HSIC

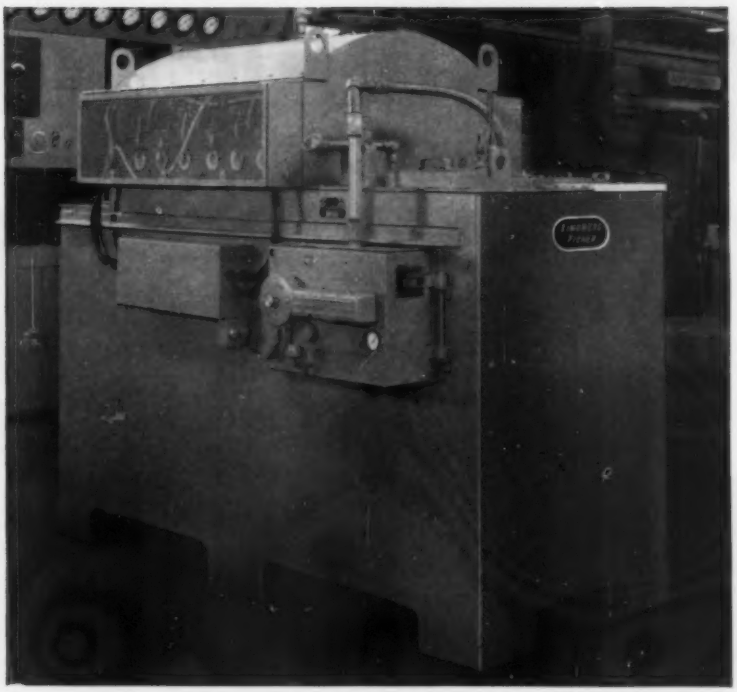
HOEGANAES SPONGE IRON CORPORATION

RIVERTON, NEW JERSEY

SALES REPRESENTATIVES IN PRINCIPAL CITIES: Birmingham, Chicago, Cincinnati, Cleveland (Fostoria), Edmonton (Alberta, Canada), Los Angeles, Minneapolis, New England (Elmira, N.Y.), Philadelphia (Riverton, N. J.), Pittsburgh, San Francisco, St. Louis

For more information circle No. 22 on the Reader Service Card

There's a Lindberg Aluminum Holding Furnace Just Right for Your Specific Job



This is Little Joe, the Lindberg Autoladle, the first practical automatic aluminum ladling unit yet devised. An exclusive feature of Lindberg electric resistance holding furnaces, "Little Joe" makes automatic casting of aluminum fast, dependable and economical.

Electric resistance holding furnaces for aluminum have been a specialty of Lindberg engineers for years. These furnaces have proved themselves in superior operation in varied industries, the world over. Now Lindberg offers a complete line, newly-designed, available in capacities of 1,000, 1,500, 2,000, and 3,500 lbs. If your production processes require proper holding of aluminum you can depend on Lindberg to provide just the right equipment for the most efficient and practical answer to your problems.

Lindberg makes a wide variety of melting and holding furnaces for aluminum, brass, bronze, tin, zinc, lead and other non-ferrous metals. These include aluminum induction, nose-pouring crucibles, electric resistance holding furnaces and big reverbs. For foundry, permanent mold or die-casting plant, independent or captive, there are Lindberg melting and holding furnaces to fit every need.

If your problem in this field needs a special solution Lindberg's design staff can find it. Just get in touch with the Lindberg plant or the Lindberg Field Representative in your locality, or write Lindberg-Fisher Division, Lindberg Engineering Company, 2463 West Hubbard Street, Chicago 12, Illinois. Los Angeles Plant: 11937 South Regentview Avenue, at Downey, California.

LINDBERG heat for industry

For more information circle No. 63 on the Reader Service Card

HOW UNIQUE ALUMINUM CUTS PRODUCTION

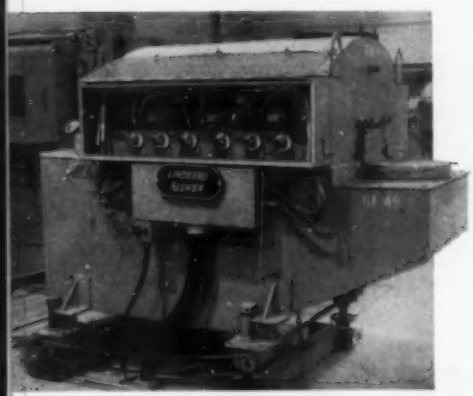
SOME OF the 63 Lindberg-Fisher Electric Resistance Reverberatory Holding furnaces in the Ford-Sheffield plant are shown in the permanent mold area. Others with automatic ladling serve the die-casting operation. All use GLOBAR Delta silicon carbide electric heating elements because they lessen contamination, help keep production uninterrupted with simple replacement.

NEW CASTING PLANT COSTS:

Ford Motor Company buys molten aluminum . . . saves with GLOBAR® electric heating elements in 63 holding furnaces

A pace-setting new casting plant built by Ford at Sheffield, Alabama, has actually eliminated the cost of melting aluminum. Molten aluminum is delivered from a nearby plant. That wipes out the need for storage area and the cost of handling pig aluminum. This new concept in casting plant economy is already being adopted by other automobile makers.

Pictured at left are some of the 63 Lindberg-Fisher Electric Holding furnaces developed in co-operation with Ford Motor Co's. engineers. They use GLOBAR Delta silicon carbide electric heating elements because prototype tests proved:



TERMINAL CLAMPS on low resistance end of GLOBAR silicon carbide electric heating elements are shown in position on Lindberg-Fisher holding furnace. Lindberg-Fisher is a division of Lindberg Engineering Co., Chicago, Ill.

1. Any splashing of aluminum on the silicon carbide element leaves it virtually unaffected, while metal elements tend to deform and drop into the bath causing contamination.

2. Production is not interrupted for replacement because silicon carbide elements are easily replaced.

3. GLOBAR electric elements work at temperatures well below their capacity, while metallic elements would be running at the upper limit of their range.

The original GLOBAR Delta elements have been in use, without trouble of any kind, for 10 months.

The ECONOMIC advantages of electric heat:

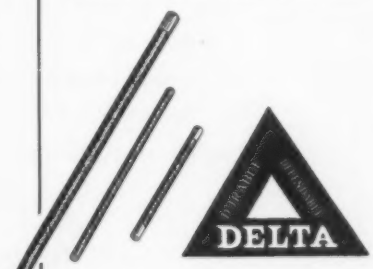
There are many reasons why the use of GLOBAR Delta silicon carbide elements are economical as well as dependable, clean, safe, and quiet. There is no fire or explosion hazard, and exhaust and fuel storage facilities—and costs—are unnecessary.

Only with electric heat can heating cycles be precisely duplicated and temperatures accurately controlled, independent of the atmosphere. Product quality is improved and rejects sharply reduced. Electric furnaces and kilns are compact and space-saving. They can be located in the production line, thereby accelerating production and reducing costs per unit of product.

The investigation of an electric heating application should include more than the comparison of BTU and electricity costs. Lower furnace maintenance and operating cost, plus full utility of BTU input, will frequently more than offset a fuel cost differential.

Installation of Delta elements is simple, and element replacement is accomplished quickly without cooling the furnace or interfering with production.

Typical applications for GLOBAR Delta elements include furnaces and kilns for: heat treating, forging, sintering, brazing, annealing, melting, assaying, roasting, laboratory and research: and ceramic firing of ferrites, titanates, steatities, refractories, electrical insulators, grinding wheels, whiteware, pottery and tile.

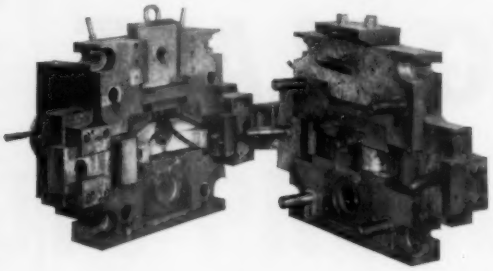


Find out how your operation could profit by using GLOBAR Delta silicon carbide electric heating elements. Your furnace builder can supply you with full details. The Carborundum Company, Refractories Division, Globar Plant, Dept. PM128, Niagara Falls, New York.

CARBORUNDUM

Registered Trade Mark

For more information circle No. 9 on the Reader Service Card



CROMO-HIGH V

a "long-run" grade for die-casters

Many die-casters know from experience that they can count on long production runs when they use Cromo-High V Tool Steel. And this is true whether you're casting zinc, aluminum, or magnesium.

Cromo-High V—Bethlehem's 5 pct chrome-moly tool steel with 1 pct vanadium—provides fine die-casting service because of its extra toughness, and resistance to wash and erosion. It is made by a controlled melting procedure, and has good center density and grain refinement. It is uniformly annealed for ease in machining, and is free from porosity.

Moreover, Cromo-High V is ultrasonic-tested for quality. It responds readily to heat-treatment, and permits uniform heat-treatment in massive sections to a hardness of Rockwell C45-47.

These are all good reasons for using Cromo-High V in your toughest die-casting jobs. Your Bethlehem tool steel distributor has Cromo-High V in stock, and can get it to you quickly. Call him now.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

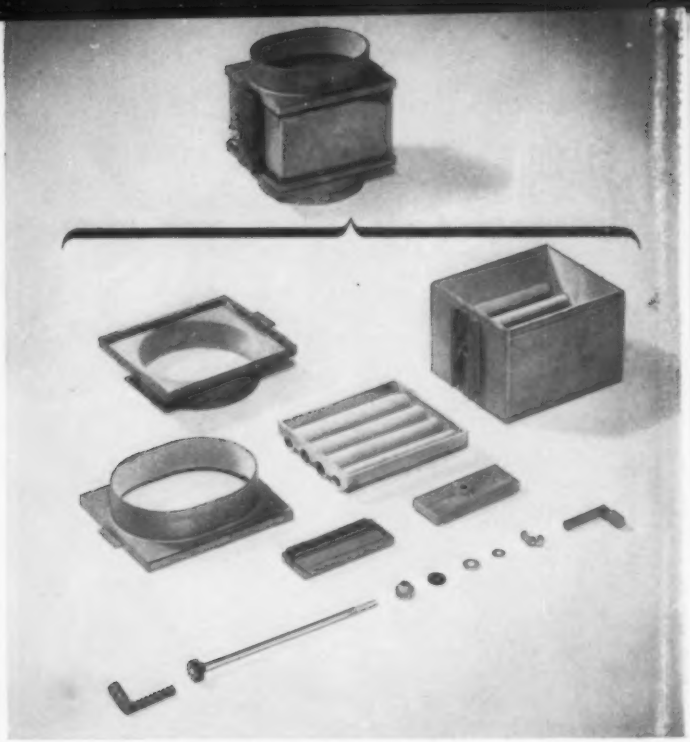
On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL

For more information circle No. 7 on the Reader Service Card

D-J casts, finish machines, plates and assembles door hardware for a Mid-West merchandiser. Eleven zinc parts are die cast . . . then tapped, reamed, faced and plated. Other parts are drawn and stamped as needed. Springs, lock washers, screws, locks and keys are purchased. Finally, D-J assembles and packages the units.

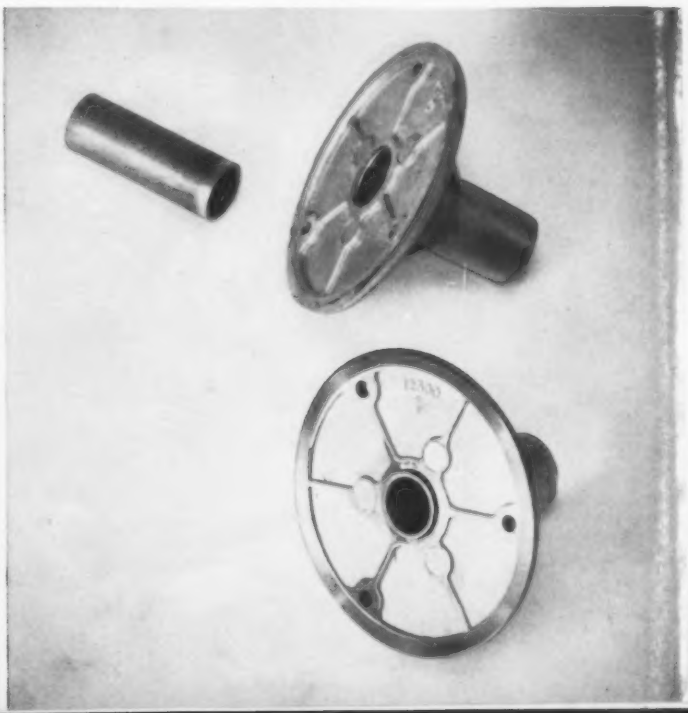


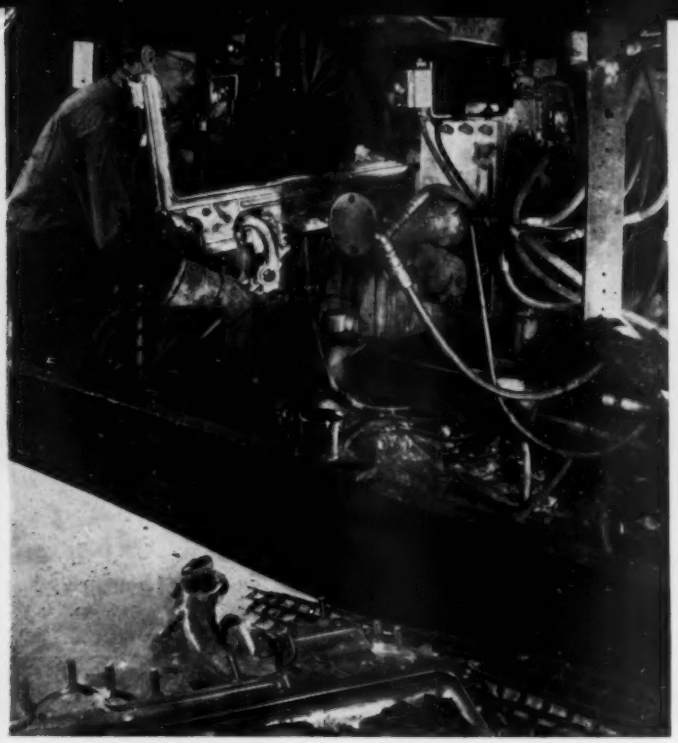
D-J die casts, machines, flock finishes and assembles damper for York Corporation. Unit is a complex high precision assembly of ten die cast parts including racks, pinions, and pistons. D-J flocks interior parts before assembly, seals seams to air-tightness under pressure. Exterior surfaces are carefully alodined.

3 pages of proof Doehler-Jarvis can do more for you than die cast parts...

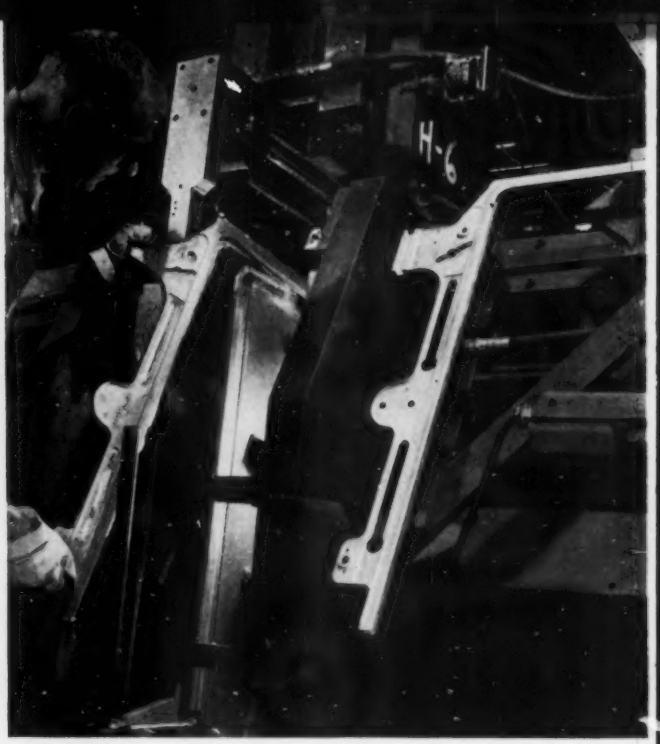
D-J casts, profile shapes, taps and electro-statically paints TV set parts for Radio Corporation of America. Ready-for-assembly die castings are by far the lowest-cost way to produce lightweight metal bezels and glass retainers for RCA Victor TV sets. Their dimensional stability speeds assembly.

D-J casts, machines, and assembles turntable hubs for well-known phonograph manufacturer. Hubs are trimmed, turned, slotted, reamed and fitted with bearings. The bearings are then chamfered and sized. Tolerances of 0.001 inch or less are maintained throughout all these operations.





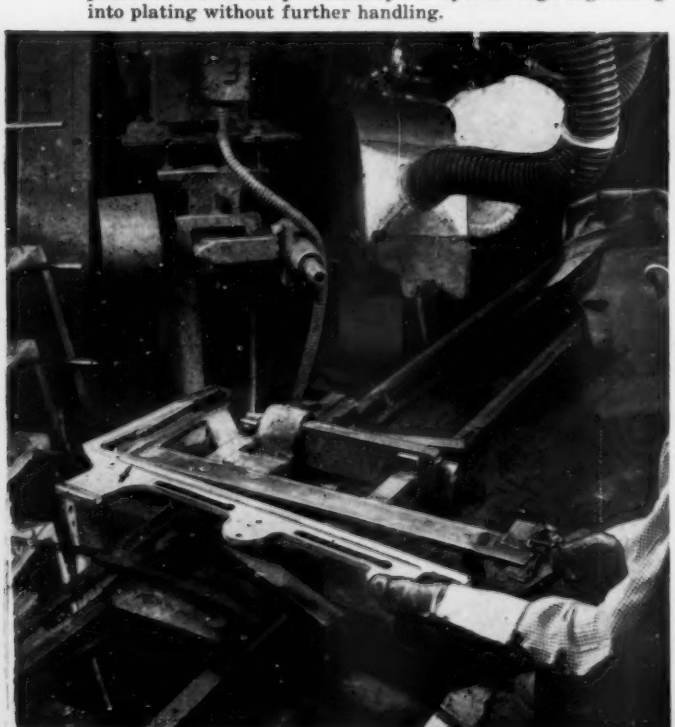
1 **Operator removes die cast zinc main channel** for Lincoln or Continental window assembly from large 48" casting machine. Part is quenched in cooling solution then conveyed to trimming. D-J is now researching production techniques on giant 72" machine, world's largest.



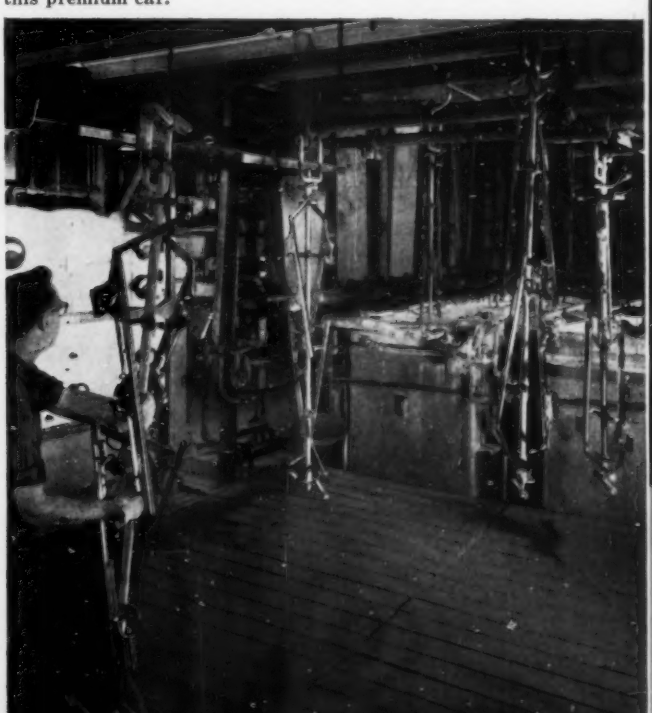
2 **Ingenious double-acting trimmer removes gate,** trims flash, finishes slots, taps 3 holes. Notice jig at right miters corner of frame. Scrap metal is collected, re-melted, re-refined and re-used. Minimum metal consumption is a big advantage of die casting.

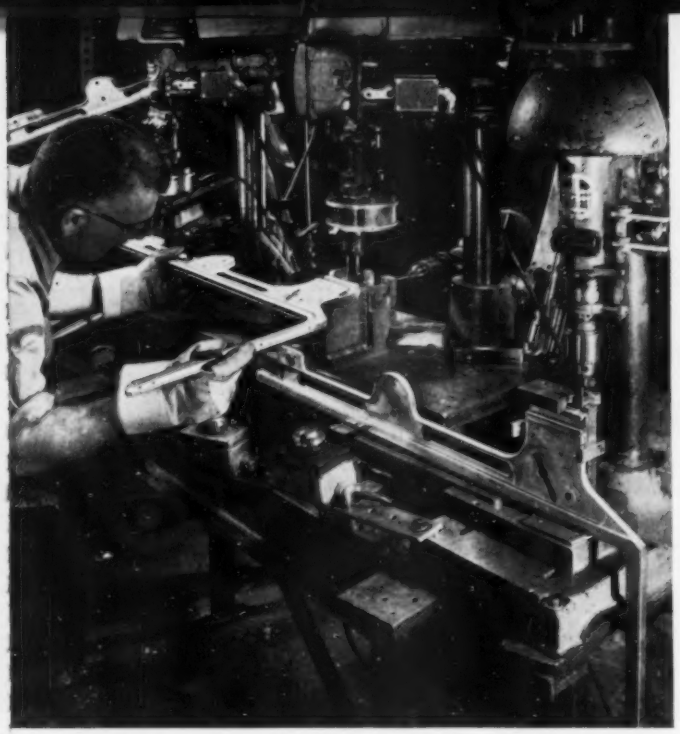
...D-J makes, machines, plates, puts together

4 **Buffing, too, is set up for maximum economy.** Part is snap-clamped to device that positions it automatically for buffing wheels. When leaving fast-moving buffing lines, parts are racked and processed by conveyor through degreasing into plating without further handling.



5 **"Christmas trees" carry channels through plating.** Part is given optimum copper, nickel, chrome thicknesses using an automatic "plate-on-plate-off" current sequence that develops unusually high quality long-lasting finish desired for this premium car.





3 **Ganged machines complete drilling, tapping, reaming.** Behind operator you can see a universal work toting device. Removable pins support work and present it to operator prepositioned for speediest handling. (For another view of device, see following picture.)

Not everyone knows that Doehler-Jarvis does extensive machining, finishing and sub-assembly work as well as die casting.

But it's true. Every Doehler-Jarvis Plant (8 in the U. S. and Barber Die Casting in Canada) mass produces sub-assemblies, as well as die casting and finishing basic parts. And you can rest assured, costs undercut those that customers might achieve in their own plants.

Costs are bound to be low. Doehler-Jarvis has in abundance versatile machining, metal forming and joining equipment plus finishing facilities that are unique. Experienced design, purchasing and production personnel, too. Everything needed to set up economical, continuous production, assembly, and packaging lines.

a window assembly for the Lincoln Continental

6 **Window is glazed and finish assembled in special jig.** Here die cast channel, glass and other parts (some made, some purchased by D-J) are put together and weather sealed. Packaged part is shipped both to the Lincoln and Continental plants and to distributor warehouses.

There are other savings, too . . . savings in *your* plant. Less tooling, for example. And you receive a responsibly inspected, fully functional sub-assembly ready for immediate use. Many D-J customers take delivery only on sub-assemblies needed for basic production. Spare-part production goes directly to customer's distributors.

Makes sense, doesn't it? Especially when you see, as in these three pages of pictures, how D-J handles typical production work.

Maybe you could push your costs down this way, too. Care to talk it over?

Doehler-Jarvis

DIVISION OF NATIONAL LEAD COMPANY

General Offices: Toledo 1, Ohio

In Canada:

Barber Die Casting Co. Limited

Hamilton, Ontario

For more information circle No. 36 on the Reader Service Card

HYDRAULIC SAFETY BULLETIN

IMPROVED FIRE-RESISTANT UCON HYDROLUBES QUICKLY, EASILY INSTALLED IN HYDRAULIC SYSTEMS

Standard flushing and refilling procedures are sufficient for Ucon hydrolube safety hydraulic fluids.

Most hydraulic systems can be quickly and easily converted to fire-resistant Ucon hydrolubes from flammable petroleum oils or synthetic fluids. Actual experience, in hundreds of industrial installations, shows that standard flushing and refilling procedures, involving a minimum of time and effort, are sufficient.

Installation Procedure

The procedure generally followed in converting to Ucon hydrolubes from petroleum hydraulic fluids is:

1. Drain the petroleum oil from the system and remove residual sludge and deposit.
2. Flush the system with Ucon hydrolube.
3. Install a clean filter and replace any worn pump parts and deteriorated gaskets, seals, or packings. Repair leaking pipe joints.
4. Operate at reduced pressure to insure proper lubrication of the hydraulic pump; then, bring the system up to standard operating conditions.

Experience also shows that, once installed, Ucon hydrolubes require a minimum of maintenance because the tendency to creep through pipe fittings and along pump shafts and cylinder rods is often significantly less than with other types of fluids.

FIRST FEW WEEKS IMPORTANT

During the first few weeks of operation, filters and inlet screens may sometimes become clogged by sludge and other unwanted deposits loosened by the solvent action of the hydrolube. Since stoppage may cause pump starvation and cavitation, noisy operation, and high pump wear, filter cartridges should be replaced and inlet screens cleaned as often as needed.

When replacing non-aqueous, fire-resistant fluids with Ucon hydrolubes care should be taken to remove all of the previous fluid from the hydraulic system. This can best be done by draining the non-aqueous fluid from the system, flushing with a petroleum hydraulic oil and then following the installation procedure previously outlined.

FIRE-RESISTANCE PROVED BY TESTS

The common fire hazards connected with hydraulic operations are eliminated when Ucon hydrolubes are used. This has been proved by tests and more than 10 years of routine use in industrial hydraulic equipment. Ucon hydrolubes are approved by Factory Mutual Laboratories.

Get all the facts on Ucon hydrolubes. Write for the booklet, "Ucon Hydrolubes Spell Safety." Address . . . Department B.

UNION CARBIDE CHEMICALS COMPANY

DIVISION OF UNION CARBIDE CORPORATION

30 E. 42nd Street, New York 17, New York

The terms "Ucon" and "Union Carbide" are registered trade marks of UCC.

For more information circle No. 46 on the Reader Service Card

LETTERS

the readers' forum

TRANSMISSION PARTS

This will answer your letter of October 14th with reference to a photograph of a zinc die cast transmission part. I have checked into this and have found that the wrong information had been given us by the factory using the part. The piece is die cast in aluminum not in zinc.—W.E.B. vice pres.

The part referred to is shown in our October issue, page 70. A question was raised about transmission parts being die cast in zinc. Obviously, the information supplied to us originally was in error.—Ed.

INVESTMENT CASTING DIRECTORY

Do you have a list or directory of companies doing investment casting work? If not, could you possibly tell us where one might be obtained.—J.J.D., pres.

PRECISION METAL MOLDING *publishes a directory of the investment casting industry every June. This is one of the three regular directories we publish.—Ed.*

PLANT LAYOUT

Do you have any data covering a complete plant layout and design for tool and die making, die casting and manufacturing pertaining thereto.—W.E.H., pres.

For small shops, particularly those doing custom work, layout of a shop or plant is largely a matter of individual preference. Tool and die shops can seldom follow a fixed progression from machine to machine. Here a lot of handling is always required. In die casting shops no fixed pattern can be set. Some shops, for example, put trim presses next to the casting machines. Others have a trim line serviced either by a hook line conveyor or by tote boxes moved by truck. As for other operations, that depends on what operations are contemplated. An experienced consultant could probably be of some help in layout.—Ed.

PLASTER MOLD CASTING

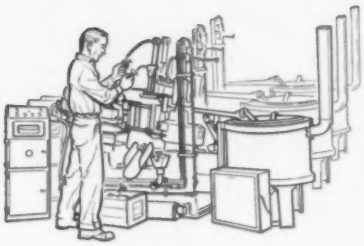
We are interested in obtaining information regarding plaster mold castings for aluminum alloys. Sources of technical literature on the methods used in this process will be greatly appreciated. —E.C.S., chf. eng.

The best source of information on plaster mold casting is either the back issues of this magazine or the literature published by the companies who make plaster for this casting industry. A few of the foundries who do this work have very informative bulletins.—Ed.

continued on page 47

total automation*

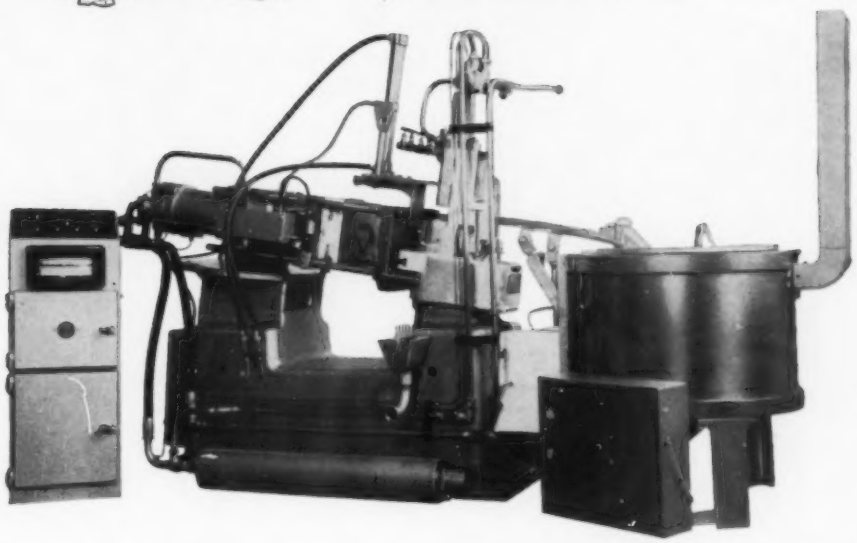
comes to die casting
with the continuously recycling



DCMT RAM

fully automatic die casting machine

Up to 1,500 shots per hour without an operator!



***For the first time**
a small and medium parts die casting machine that

- **cleans itself**
- **lubricates itself**
- **water-cools itself**
- **recycles itself**
- **unloads itself**
- **feeds itself** new supplies of molten metal on demand

Now... you can have a **completely automatic** die casting operation for small and medium zinc alloy parts. You can set **entirely new production levels,** bid for a **much larger share** of the growing up-to-one-pound die casting market; **compete on jobs** which, until now, were lost to other production methods!

Now... **one setup man** can service a **bank** of **high-speed DCMT RAM Automatics.** Piece by piece, this means lowest **labor** cost, lowest **inspection** cost, lowest **die amortization** cost; lowest **trimming** cost and **highest casting output** per unit of floor space! It also means **minimum rejects** and **uniform quality** throughout.

Keep up with **progress** in the die casting field! Write today for an illustrated booklet giving details and specifications of the exciting new DCMT RAM Automatic.

B. I. C. ENDORSED QUALITY

DCMT

SALES CORP.

Division of British Industries Corp.
Port Washington, New York

DCMT SALES CORP., Dept. DX 368
Division of British Industries Corp., Port Washington, New York

Gentlemen: Please send "RAM Automatic" booklet.

Also send literature on these other DCMT die casting machines:

☐ **IMP/96 mk II** (fully air-operated)

☐ **ADC 56 Rotorcaster** (for casting aluminum around rotors of small motors)

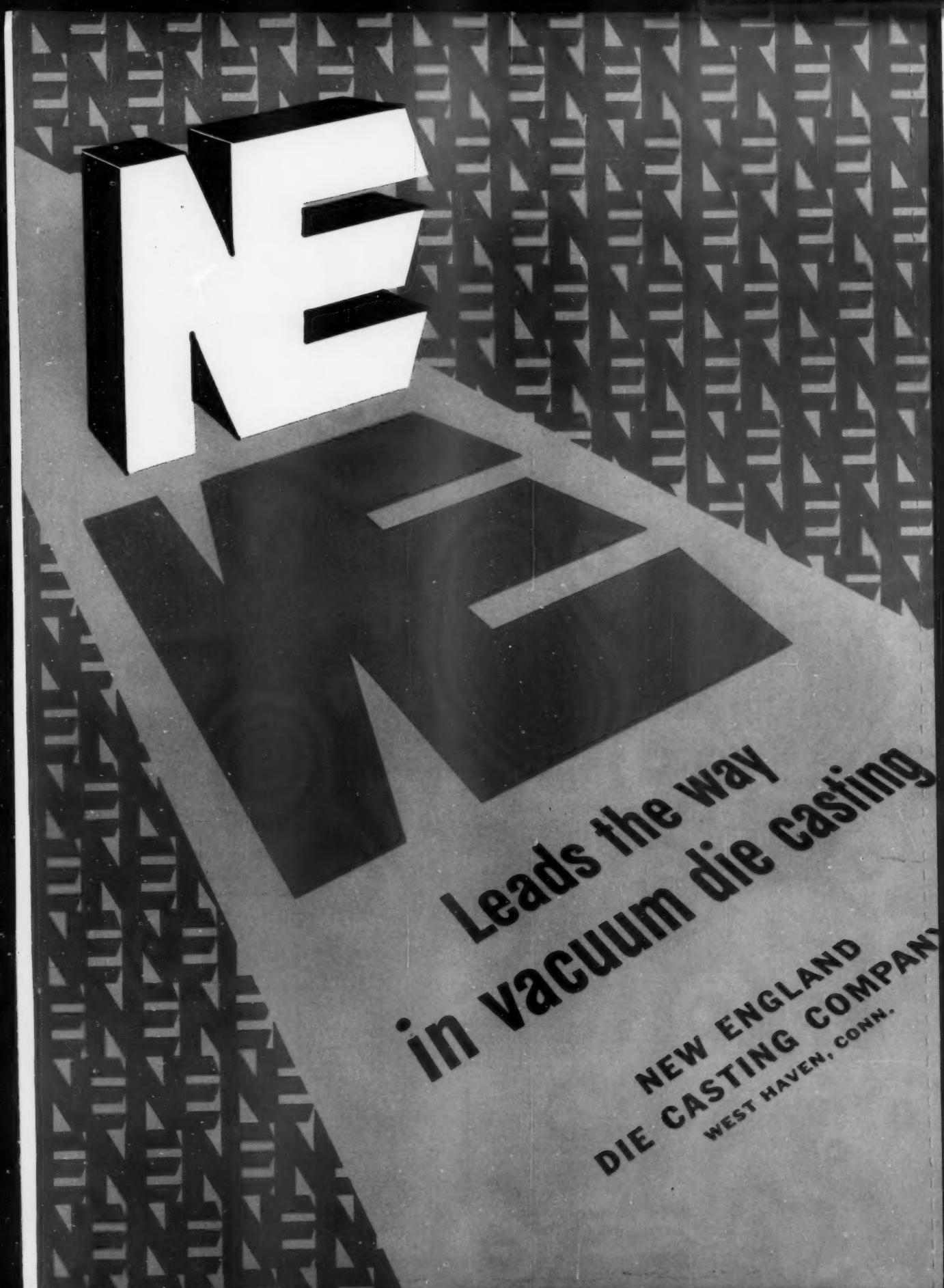
NAME _____

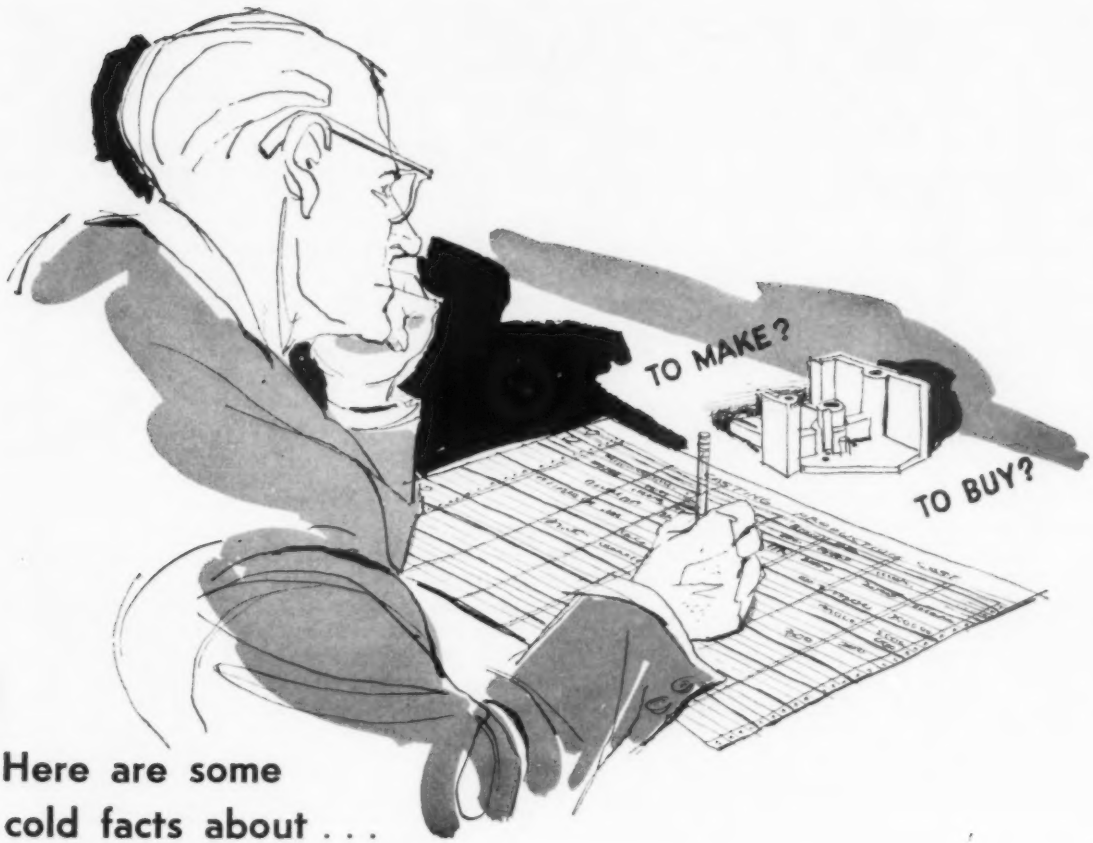
TITLE _____

COMPANY _____

ADDRESS _____

For more information circle No. 24 on the Reader Service Card


NE
Leads the way
in vacuum die casting
NEW ENGLAND
DIE CASTING COMPANY
WEST HAVEN, CONN.



Here are some cold facts about . . .

Buying vs Making Die Castings

BY DAVID LAINE*

WITH every swing in the economic cycle the question of BUY OR MAKE is intensified. Die casting, just as other segments of American industry, periodically comes under analysis in this connection. All too often lush and alluring pictures are painted of the rich harvest that "do it yourself" will yield. This non-realistic approach takes deft advantage of the abstract nature of the problem and succeeds only in confusing a complex situation.

Serious and responsible custom die casters, as well as experienced and able purchasing agents and value analysts, find themselves in a dilemma as a result. The die caster is well aware of the pitfalls and disappointments that more often than not are the only yield from an ill-advised or un-realistic decision to stop buying and start making. Yet he is forced to remain silent lest he be accused of self interest.

The sincere and competent purchasing agent, in spite of the glib and smooth picture of profits set before him, finds himself honestly questioning and inwardly doubting. He is deeply concerned and sorely troubled by the lack of a yardstick, or gauge, with which to measure and test the validity of the claims.

Cold facts and harsh truths are not as alluring as the promises of his savings and the lessons learned from sad experience are all too late.

The issues should be faced squarely. While no pat formula, or facile guide, can be propounded to readily resolve the situation, a template for testing the validity of the case does exist.

Stripped to its bare core, and without the 'machine-that-pays-for-itself' approach, the advantages claimed for 'do-it-yourself' are lowered costs – eliminating the custom die caster's profit, producing better die castings of improved quality, retaining the cost reductions resulting from increased productivity. The very speculative nature of these claims make it obvious that only subjective evaluations can prove or disprove them.

The unrealistic quality of the typical approach is clarified if it is written thus –

Assume the percentage of your vendors profit.
Assess the savings of undefined quality improvements.
Presume the production levels and productivity gains.
Add together.

continued on next page

*SECRETARY AMERICAN DIE CASTING INSTITUTE

The real meaning is, obviously, estimate the cost of making in a die casting plant or department not yet constructed, on equipment not yet installed, by labor not yet hired.

Such reasoning is used to justify expending the prospective capital to buy the machines. It always works out if you use figures on costs, and labor rates, and output, provided by the equipment producer or outside salesman.

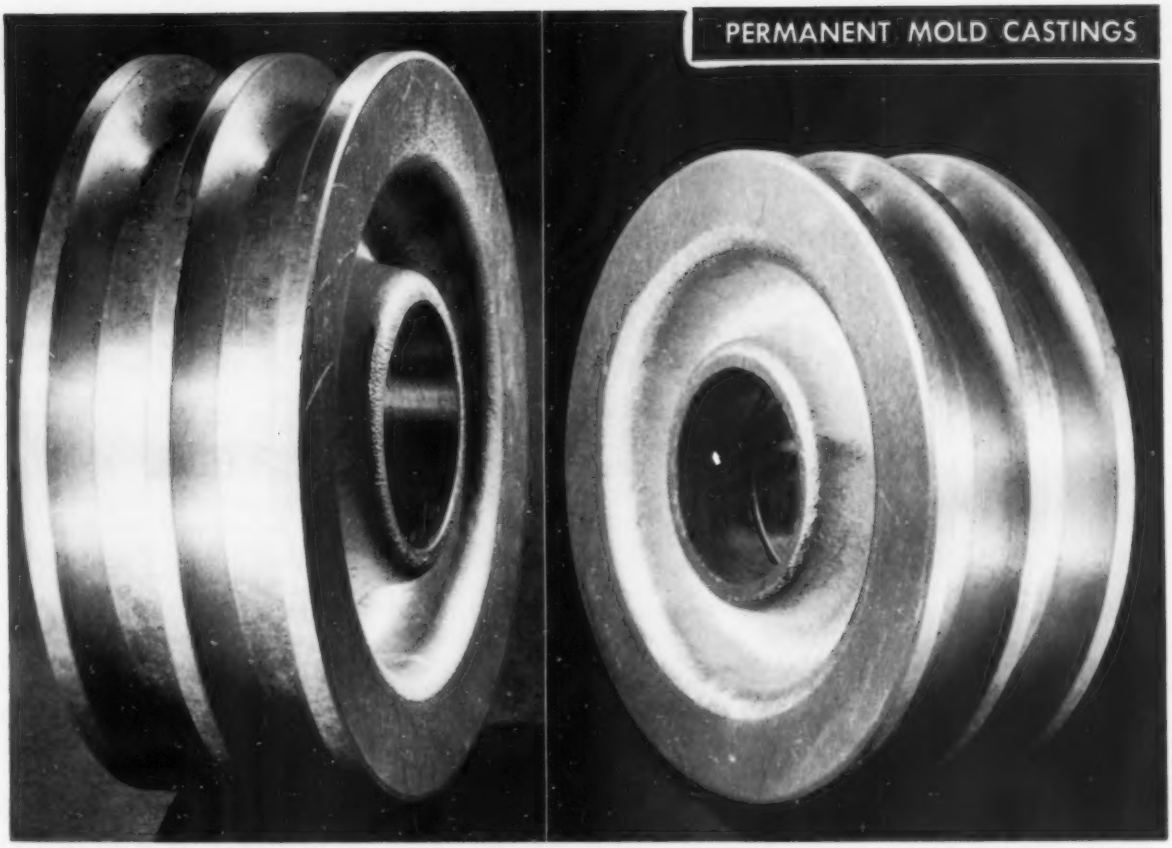
However, before cancelling that order for red ink, or effecting a reduction-in-force among your die casting buyers, or increasing your company's dividend rate, it might be in order to consider a few questions that may temper any pending decision to stop buying and start making.

In considering the economics of setting up to make die castings the reviewing executive might profitably seek answers to the following suggested questions.

- Is it really true that all we need is ordinary machine operators and some helpers?
- What wage rates, bonus levels and piece work rates did we use in our estimates and how realistic are such rates?
- Is the resulting unit cost based on realistic hourly rates and are the estimated pieces per hour used equally realistic?
- Do the wage rates and productivity estimates reflect actual time studies or opinion as to standard output?
- Are studies of productivity per hour at less than maximum demand available?
- How long does it take to get maximum productivity, or even full plant output, in a new plant, or on a new or different machine, or from a new die?
- How did we handle start up costs?
- How do we plan to design die castings to assure maximum economy? or do we know that the design can be die cast?
- Do we have die designers to translate our casting needs to the tooling required?
- Are we planning to make dies, too? If so, have we the needed skilled labor? If not, how do we know what to pay for a die?
- How do we plan to make die repairs? to maintain dies? to charge these costs into piece costs?
- Do we have tool engineers or designers who can devise trimming and machining sequences and tooling at maximum economy?
- How much will what we can't do, cost us? How much is that per piece?
- Was our hourly die casting output estimate checked against tooling design or die design?
- If we need new classes of labor will the skills involved affect our present labor contracts or rate structures? Will the productivity estimated and the wage rates involved yield earnings in line with our present average hourly earnings? If not, what will it mean?
- How much do we know about the zinc or aluminum metals markets? Can we establish reliable sources for our needs?
- What are our metal needs? What inventory will we carry? What will we do with our generated scrap? our rejects?
- Have we metallurgical talent to be sure that our remelt is in specification? If not how do we handle the metal cost involved?
- By the way, how did we set out reject level?
- What other materials will we need? Are we familiar with prices and sources for such items?
- Will our buying cost be reduced or increased?
- What about burden rates or overheads? How did we project them? How do we decide how to allocate them to die casting output? How do we include depreciations, obsolescence factors, other costs.
- How do we charge the die casting operation for services supplied by other departments? or machine time utilized?
- How did we include non-productive services, research and development expense, executive services?
- On what kind of a basis did we establish the relationship of fixed and variable costs? Will it work if we need more space, or new machines or additional management?
- Does it reflect cost for present and varying technical services?
- Will our basis work if additional capital, or outside financing, proves necessary?
- What effect has the cost of die casting machines on piece prices – or even machine hour rates?
- Is the possible net realizable return the optimum utilization of capital funds?
- How did we evaluate the effect of 'making' on our relationship with our present suppliers? Will we be able to get quotations on die castings we may decide to make? Suppose we can't make all sizes or designs will our costs be affected on what we must buy?
- Can we really make die castings of equal or better quality? How long does it take to get there and at what cost?
- Can we keep up with advancing technology and technique improvements while we are catching-up?
- Are we aware of research and development in progress by our suppliers of their industry?
- Do we know how to evaluate our equipment needs? How did we reach our decisions? How do we decide basic questions such as the economic effects of new process cost as related to actual production cost?
- Do our unit total costs stand up when all factors are considered? What correction factor will we use to offset seasonal effect? Will it compensate for volume fluctuations? If we under-absorb burden how do we correct for it? How is this reflected in piece price comparisons? If we over-absorb, how are we sure of the inter-relationship of the changes we make? How much cost will we have to absorb in order to reach a break-even point if we establish realistic overheads during break-in?
- Has any decision been arbitrary or the reflection of pre-conceived opinion by any executive or group in our company?

It is likely that valid answers to the above questions will disclose some areas not properly evaluated or too readily dismissed as unimportant. If this be the case it might be well to reconsider.

It is rumored that even successful die casters have unprofitable years. It is a fact that every die caster has some break-even or loss jobs. Did you ever think that they might be the very jobs that you are planning to make at so substantial a savings?



REDESIGN AWAY FROM SAND CASTINGS and you can't have inclusions that wreck cutting tools and slow down production.

Here's how to . . .

Cut Rejects And Product Weight

BY ROBERT J. RUTHERFORD*

MANY companies have many reasons for converting from sand castings to permanent mold castings. Closer tolerances, for one thing. Also, there is a lot less machining needed on permanent mold castings.

These are good reasons. But we made the switch on our pully wheels at The Roth Manufacturing Co. (Subsidiary of Vapor Heating Co.) because of the high porosity factor which forced us to scrap 40% of our sand-cast pulley wheels, consistently.

The aluminum wheels are used on the automatic steam generator made by Roth Mfg. The larger is a direct pulley-wheel, the smaller one is the idler-wheel.

There has been no change whatever in the machining operations performed on the permanent mold cast wheels. First, the hub is bored to depth; next, the outside diameter is grooved for the V-belt; last, the key-way is broached.

But whenever the cutting tool was used on the sand castings, the porous areas inside the defective parts were exposed. This slowed production accordingly, making it necessary to keep enough good parts in the stockroom to hold production of the steam generators at top speed.

Of course, each one of the rejected pulley-wheels had a certain amount of labor-cost tied up in it which we would never regain.

At first we tried to do something about the porosity. The foundry supplying the cast pulley-wheels tried various gating methods. Nothing worked.

There was no change in the high-percentage reject-rate. We had to watch each casting carefully as it was being machined, stopping it as soon as the air spaces showed up.

But we learned to live with this costly problem — until a sales engineer from a permanent mold foundry paid us a visit. We tossed the frustrating, sand-cast pulley-wheel problem at him.

He solved it.

Today we use the permanent mold cast wheels seen in these photographs. They are 10% lighter than sand-cast parts. Rejects are held to a minimum: 4% on the small wheel; 1% on the large wheel.

*ASSISTANT TO THE VICE PRESIDENT
THE ROTH MFG. CO.

When design calls for an extruded aluminum shape . . .

The Die Is The Key

BY FRED G. SCHULER*

EXTRUDED aluminum can open many doors to economical design and fabrication. But the key to these doors is the extrusion die – which, expertly made by the extruder, gives the design engineer almost unlimited possibilities in developing extruded aluminum shapes.

*PRESIDENT, GENERAL EXTRUSIONS, INC.

Extruded aluminum can streamline the manufacturing of many products. It saves steps in fabrication when rolled structural shapes and formed sheet sections of other metals are used. Very often several standard rolled sections can be eliminated by a single extrusion. When these overlapping metal sections are eliminated, the cost of joining is saved. The resultant extruded aluminum unit is simpler and often stronger than the built-up assembly.

Extruded aluminum shapes are produced by forcing billets heated to a plastic condition through a die opening. The shapes emerge from the extrusion press in lengths up to 80 feet, are heat treated, straightened and cut to the desired length.

The extrusion dies are relatively inexpensive. There is no need to

TABLE I
PROPERTIES OF EXTRUDED ALUMINUM ALLOYS

Alloy and Temper	Tensile Strength Pounds Per Square Inch	Yield Strength (Offset Equals 0.2%) Pounds Per Square Inch	Elongation Percent in 2 Inches		Brinnell Hardness 500# Kg. Load 10-MM Ball	Shearing Strength Pounds Per Square Inch
			Sheet Specimen (1/16" Thick)	Round Specimen (1/2" Diameter)		
1100-S-0	13,000	5,000	35	45	23	9,500
3003-S-0	16,000	6,000	30	40	28	11,000
6061-S0	18,000	8,000	22	30	30	12,500
6061-ST4	35,000	21,000	22	25	65	24,000
6061-ST6	45,000	40,000	12	17	95	30,000
6062-S0	18,000	8,000	—	30	28	12,000
6062-ST4	35,000	21,000	—	25	65	24,000
6062-ST6	45,000	40,000	—	17	95	30,000
6063-ST42	22,000	13,000	20	—	42	14,000
6063-ST5	27,000	21,000	12	—	60	17,000
6063-ST6	35,000	31,000	12	—	73	22,000
6463-ST42	22,000	13,000	20	—	42	14,000
6463-ST5	27,000	21,000	12	—	60	17,000
6463-ST6	35,000	31,000	12	—	73	22,000

The values given in this table are averages which take into account the variations introduced by size, shape or method of manufacture.

forsake efficiency in design by using only available standard rolled sections which come closest to meeting the desired shape. The extruded aluminum shapes can be tailored to meet the definite needs of the design, meeting the requirements for strength and stiffness.

As previously stated, the most important element in extruding an aluminum shape is the Extrusion die. The design engineer can help the extruder come up with an efficient die which will be the basis of extruding low cost, quality shapes if he keeps the 10 points listed in Table II in mind.

In addition to the die, another factor can have a direct bearing on the ultimate end product cost. This is a knowledge by the design engineer of aluminum alloys. Briefly here are a few facts worth noting:

The most widely used and least expensive alloy is 6063. This alloy is used for both inside and outside applications and is a heat treatable alloy. 6063 is one of the softer alloys and is commonly used where great strength is not a factor. Other soft alloys are 1100, 3003, 6061, 6062 and 6463. Typical mechanical properties are listed in Table I.

Alloys 1100 and 3003 are non-heat treatable alloys. However, surface hardness can be obtained by secondary operations such as drawing and rolling. 6463 has the same properties as 6063 with the exception that in finishing, such as polishing and anodizing, you obtain a much brighter chrome-like appearance. Alloys 6061 and 6062 will give you a higher tensile strength. However, finish does not compare to the four mentioned above. All of these alloys can be readily punched, formed, drilled, bent, milled, polished and anodized plain or in color.

A few end products manufactured from extruded shapes include: Trim Shapes, Vending Machines, Stoves, Awnings, Refrigerators, Conveyors, Appliances, House Trailers, Boats, Structural Shapes, Automotive, Greenhouses, Ornamental Iron, Store Equipment, Partitions, Building Hardware, Chalkboard and Trim, Novelties, Shower Doors, Lighting and Ceilings, Skylights, Office Equipment and Furniture.

TABLE II

CHECK LIST FOR EXTRUSION DESIGN

1. **Drawing of the shape should have all exposed surfaces plainly marked. This will allow the die maker to lay out the die to obtain the best possible finish.**

2. **Avoid variations of wall thicknesses on the same surface, by keeping uniform wall thickness you eliminate a possibility of metal flow lines where the different thicknesses meet.**

3. **Angle or channel sections that require additional strength should have a radius on inside corners. In fact, to speed up extrusion production and lower your cost, all shapes should have a slight radius on ends and corners from .005" to .010".**

4. **To obtain a brighter finished extrusion after polishing or anodizing, the exposed surfaces, where possible, should have either large or small grooves or ribs.**

5. **Design sections symmetrical wherever practicable. This eliminates the possibility of a secondary operation of rolling or forming to exact requirements.**

6. **Hollow shapes should have a minimum wall thickness of .040", solid shapes .035", wall thicknesses should be uniform throughout the section if possible.**

7. **Standard Tolerances are:**

   From .000" to .125" ± .007"
   From .126" to .500" ± .010"
   From .501" to 1.000" ± .015"
   From 1.001" to 2.000" ± .0175"
   From 2.001" to 3.000" ± .020"
   From 3.001" to 4.000" ± .025"

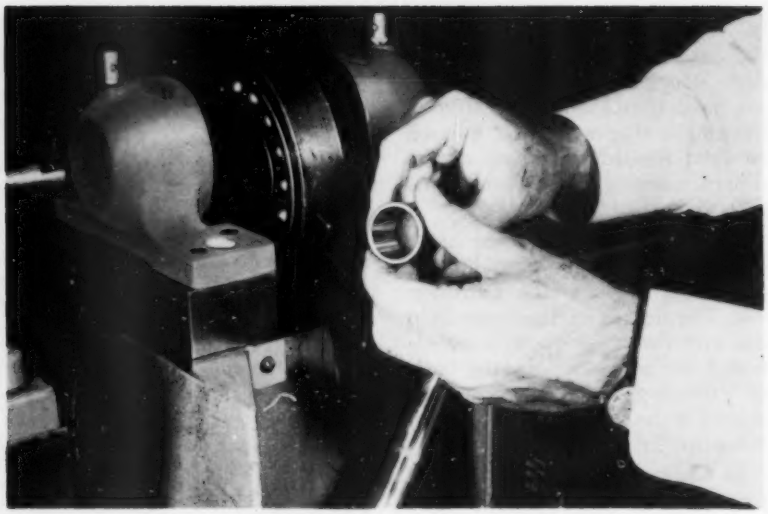
   Many dimensions can be held to plus or minus .005" at no extra cost.

8. **Avoid long narrow openings on Channel and related shapes, otherwise you will have what is termed a semi-hollow condition and correspondingly higher cost.**

9. **Costs vary and shapes are classified as follows with the lowest cost listed first:**

   Rod & Bar Stock
   Solid Shapes
   Semi-Hollow Shapes
   Class #1 Hollow
   Class #2 Hollow
   Class #3 Hollow

10. **Finally a good extruder will always advise the design engineer ways and means of reducing costs — sometimes as little as .005" added to or deducted from a given dimension can lower costs.**



LIFE TESTS on iron bushings show them equal to bronze for most applications.

Photo courtesy Amplex Div., Chrysler Corp.

A new development gives . . .

A Low Cost Porous Bushing

MACHINERY and equipment designers who are faced with the problem of lowering manufacturing costs can now specify iron base bushings. The advantage—about one-fourth the cost of comparable bronze bushings.

The advantage is for the orignial equipment manufacturer who can design originally for the use of these new bushings. On replacement and repair it might be a bit risky to use them since load factors are not clearly known.

In such applications as home appliances, small motors, power tools (especially portable tools), light machinery, instruments and communications equipment as well as many other pieces of equipment the use of these bushings can make a significant cut in manufacturing costs.

With the same oil content, the mechanical properties of the iron base bushings are somewhat lower than for bronze bushings (see the table below). Possibly the most significant difference is the 2:1 ratio of yield in compression in favor of bronze. Except in heavy machinery, however, self-lubricating bushings are rarely loaded to their full, safe capacity so this should not present a problem.

In addition to lower cost, these ferrous base bushings have another advantage. They can operate at higher temperatures than their bronze cousins. Because of this higher operating temperature an iron bushing can withstand overloads for a longer period of time than bronze and can even run dry for a short while. They also operate successfully with oscillating and reciprocating loads.

There's another disadvantage other than the lower mechanical properties. These iron base bushings should not be used under corrosive conditions. Test work is not yet completed, but for maximum safety use bronze where corrosion might be a problem.

Apparently moderately high humidity conditions are not a source of danger since the oil film always present offers adequate protection.

COMPARISON OF TYPICAL PHYSICAL PROPERTIES

	Iron Bushing	Bronze Bushing
Porosity, % oil by volume	18-23	18-23
Ultimate Tensile Strength, psi	10,000	18,000
Yield in Compression, psi	9,500	20,000
Rockwell Hardness	35 R_H	65 R_E
Specific Gravity g/cc	6.1-6.5	6.4-6.7

(Data from Amplex Div., Chrysler Corp.)

Built to augment production for a subsidiary of one of the big three automobile manufacturers by providing a faster, better means of trimming large castings. This press has tie bar centers of 40" front to back, 52" left to right, 4" tie bars, with a clear die area of 36" x 48" and a 30" stroke. Approach speed is 2000 IPM; return speed, 1000 IPM; power, 30 HP. . . . a very fast and efficient machine. For complete details of this or our smaller die casting trim presses of this type, write or phone.

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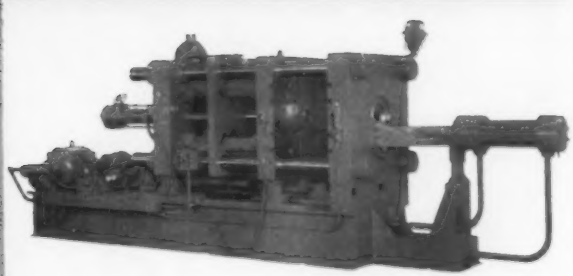

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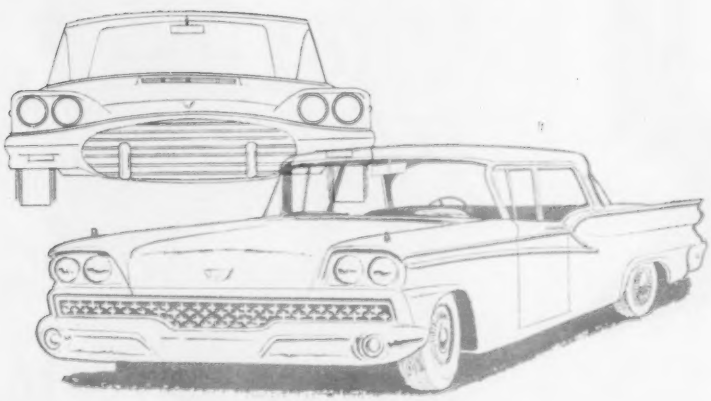
For more information circle No. 6 on the Reader Service Card

1 MOLTEN ALUMINUM is transferred, by vacuum, from the reducing furnaces to large ladles for transport to the alloying plant.

2 AFTER ALLOYING, the still molten aluminum is put into 5000 pound ladles and loaded onto a flat bed truck for transfer to the Ford plant.



From Ore To

5 PROPERLY ALLOYED metal is taken from the holding furnaces in 2000 pound ladles and distributed through the plant. A monorail carrier is used.

6 LARGE CASTINGS are made on 800 ton locking pressure die casting machines. Ladling on the large machines is automatic with Ajaxomatic units.

3 WEIGHED OUT, the metal is sent nearly one-half mile to the casting plant. A temperature loss of only about 100°F results in transport.

4 AT THE CASTING plant the alloy metal is poured into 60,000 lb. capacity holding furnaces for final alloy and temperature adjustment.

Castings—Reynolds-Ford At Muscle Shoals

OVER 37 years ago, Henry Ford said, "With the power possibilities developed I can see no reason why we should not soon have sufficient industries at Muscle Shoals to make a city of 100,000 people. I believe in developing industry close to the raw product . . . we would make our castings there, too. If the government will let me go to work at Muscle Shoals I will establish a great aluminum plant in which it will not only be extracted, but manufactured into machinery parts."

Today the plants of Reynolds Metals Co. and the Ford Motor Co. have fully realized Mr. Ford's prediction made in 1921. The mamouth reduction plants of Reynolds send molten aluminum to the Ford casting plant in 5000 pound transfer ladles. It goes right into the big holding and alloying furnaces so that ingot casting and remelting are avoided.

While there is some economy realized by this method of handling, no one knows how much because there is no history of remelting at Ford, so comparisons are not possible. But it takes a big operation to set up in this manner. Ford has contracted to take 640,000,000 pounds of metal over a ten year period. Currently Reynolds delivers 100,000 pounds per day, six days a week. Probably the "big three" of the automobile industry are the only companies in the country, maybe in the world, who can afford the luxury of this sort of an operation.

When the molten aluminum reaches the casting plant, it is poured into one of eight 65,000 pound capacity holding and alloying furnaces built for this plant by Lindberg Engineering Co. In the furnaces, the metal is refined by chlorine treatment and any additional alloying needed is done. Part of the furnace charge may be ingot from the scrap remelt furnaces. There are six 20,000 pound remelt units that handle the trimming scrap generated. No scrap metal is shipped away. These remelt furnaces, also designed by Lindberg, as well as the holding furnaces are all gas fired.

Distribution of molten casting alloy to the casting area is with a 2000 pound ladle which travels from station to station on an overhead monorail.

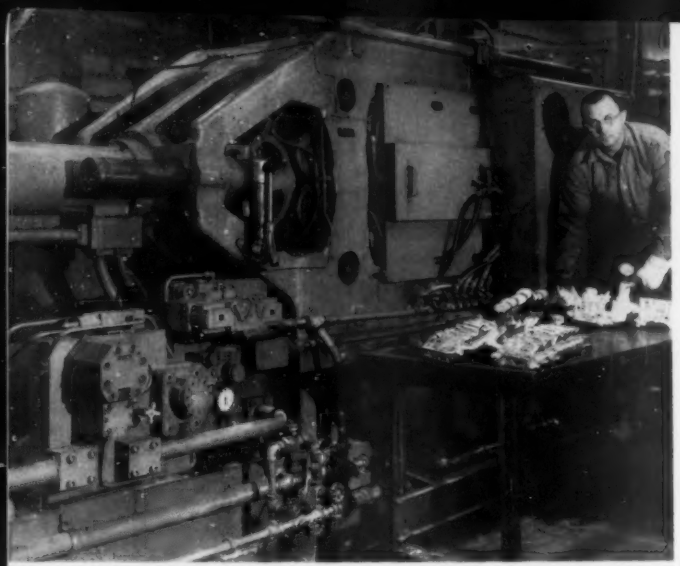
At each casting station there is a small holding pot. These are specially designed furnaces built by Lindberg and heated with Carborundum Co.'s. Globar elements. The use of electric heating elements provides a cleaner, cooler, working area and a somewhat simpler temperature control system.

In the die casting operation 67 different parts are now made. These vary in size from a tiny transmission valve part weighing only 0.052 pounds to the transmission extension tube which weighs 7.30 pounds. In spite of this wide variation in size, only two different sized die casting machines are used. All together there are 42 machines in operation, most of them rated at 400 ton locking pressure and the rest at about 800 ton locking pressure. Of these machines 36 are Lester-Phoenix units in both size ranges, the other 6, all 800 ton machines, were made by Lake Erie Engineering Co.

Depending on the casting being made, the alloy and some other factors, trimming may be done at the

continued on page 48

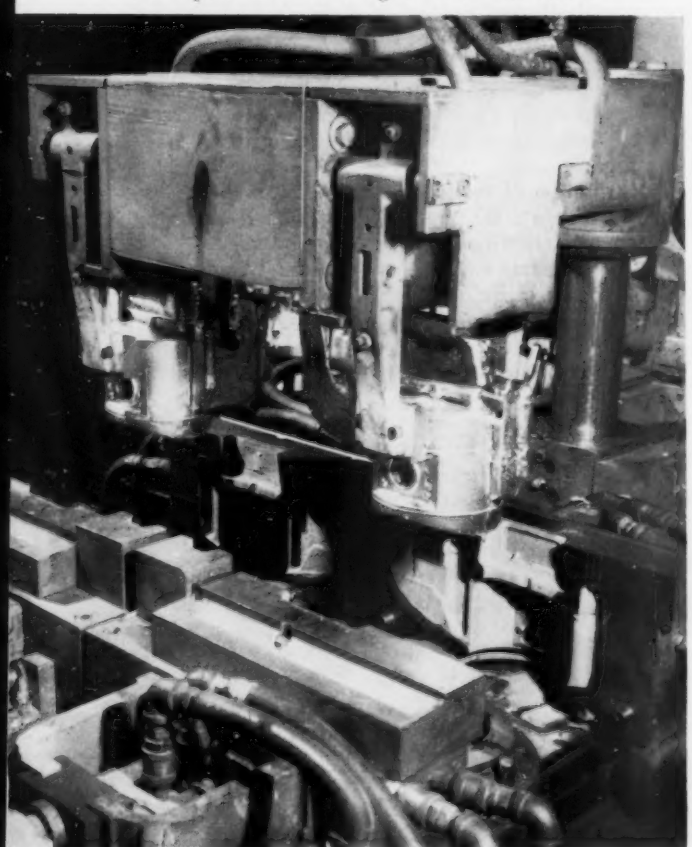
more pictures on next page



7 **THIRTY SIX** of the forty two die casting machines are 400 ton or 800 ton Lester-Phoenix units. All of the small castings and many large ones are made on these machines.

8 **PERMANENT MOLD** castings are also made in this plant. At present, all of the transmission housings are made in permanent molds such as this three segment machine shown.

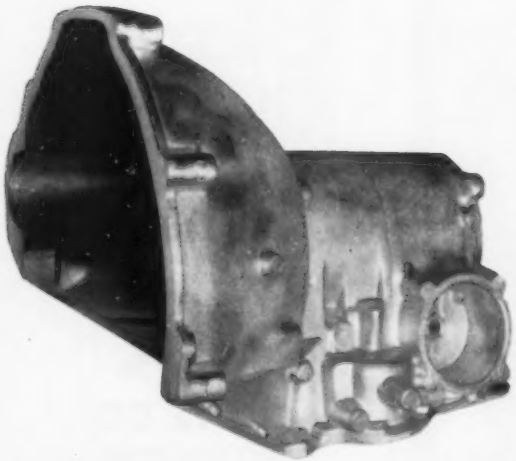
9 **PISTONS** are also cast in permanent molds. After casting, the pistons are picked up by mechanical fingers when the mold opens and are discharged into transfer baskets.



10 **AUTOMATIC GATE** and riser removal is done on a special, three saw machine. The rotating table carries 15 stations and can process over 1100 pistons per hour.

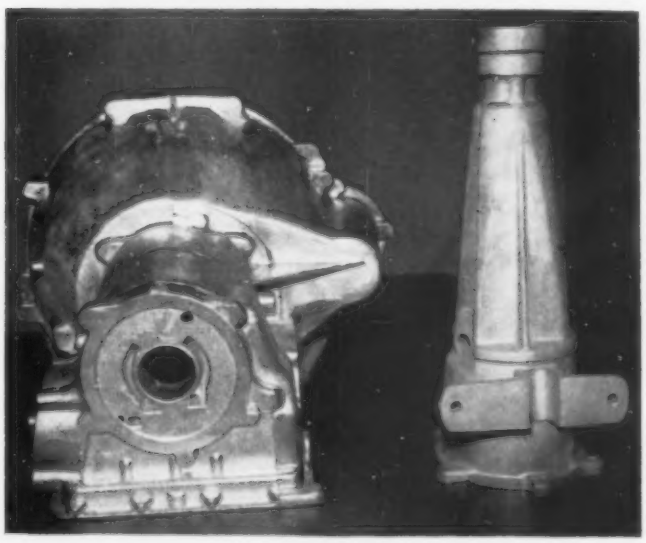
11 AUTOMATIC WEIGHING is used to sort the rough machined pistons. A 15 gram tolerance is allowed.

12 SIXTY SEVEN different castings are currently being made in this plant. Weights range from 0.052 lbs. to 24 lbs.



14 THE LARGEST PART now being made is the transmission housing. Rough trimmed it weighs about twenty four pounds. A comparable iron castings would weigh several times as much.

13 LARGE CASTINGS make up the bulk of the tonnage cast. Left, a transmission housing and right, a transmission housing extension. The housing is a permanent mold casting and the extension a die casting.



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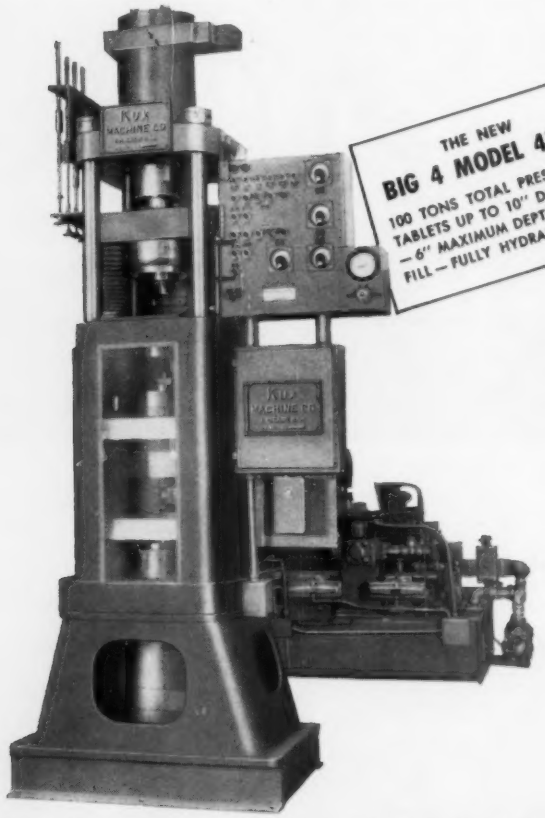
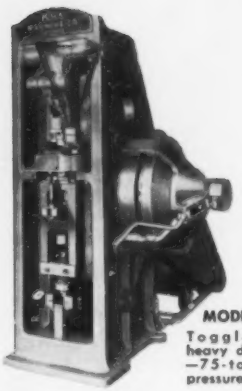
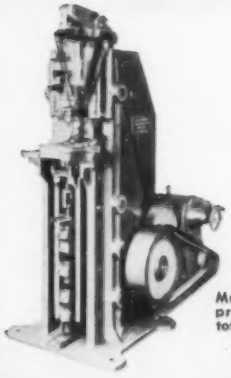


- **Fully Hydraulic**—applies pressure to tablet with both upper and lower punches. Lower punch ejects tablet with full forming pressure.
- **Completely Automatic**—pushbuttons operate machine continuously or through a single cycle with an automatic stop position.
- **Accurate Dimensional Thickness of Tablets**—upper and lower punches come to a positive mechanical stop position, holding thickness of each tablet.
- **Always True Density**—upper and lower punches can be adjusted to come to a hydraulic pressure stop position, applying exact pressure on the tablet to give true density regardless of variation in die fill.
- **Perfect Punch and Die Alignment**—combination leader-pin, ball-bearing guides keep upper punch in perfect alignment with die at all times, so that close tolerance parts can accurately be made.
- **Push Button Control of Adjustments**—for upper punch penetration into die, and the die fill allows instant and accurate change of either setting, and scales show the exact position of the punches at all times.
- **Independent Secondary Lower Punch Mechanism Available**—hydraulically operated with separate timing and stroke control—can be used to apply pressure, to eject compact, or to move core rod up and down during filling or ejection sequence.



MODEL 65B
Toggle type heavy duty press —75-ton total pressure.



MODEL 64
Multiple motion press—30 tons total pressure.

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MACHINE CO.

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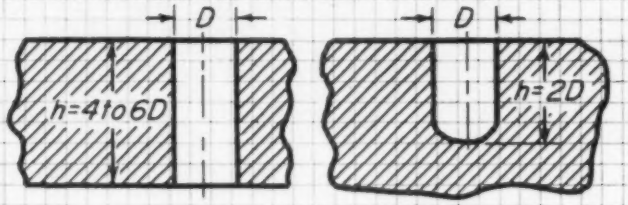
To get the best, most economical investment castings - use these design ideas

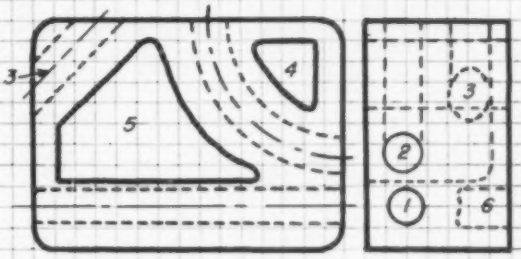
use these **Design Tips** for lower costs -better products

DESIGN DETAILS FOR VARIOUS CORE PROBLEMS

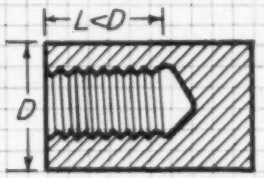


Minimum cores	D	h
Non-ferrous	0.020"	0.045"
Ferrous	0.050"	0.012"

For through holes, the length is from 4 to 6 times the diameter.
In blind holes, the maximum depth is twice the diameter.



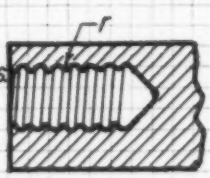
Cores should be straight. Draw cores can be located either in the plane of parting or perpendicular to it. Six types of cores illustrate that cores may enter from any face, at any angle or be uniformly curved or tapered.



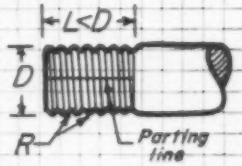
Not recommended

Cast threads should be avoided. If necessary, use rounded threads. Best possible fit is Class 1.

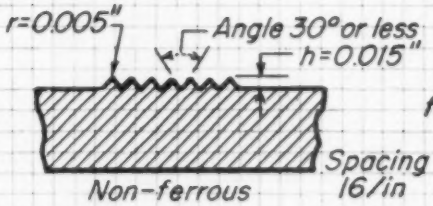
Material	Min radius R	Min radius r	Max threads
Non-ferrous	0.005"	0.020"	16/in
Ferrous	0.012"	0.035"	10/in



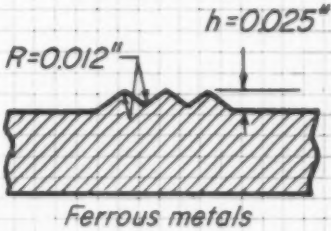
Preferred



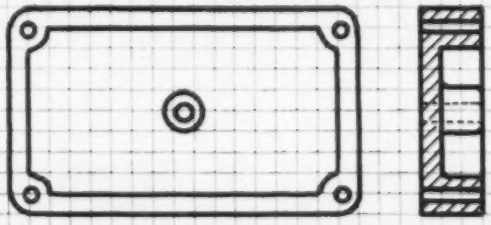
When threads are longer than $\frac{1}{2}$ in shrink must be accounted for.

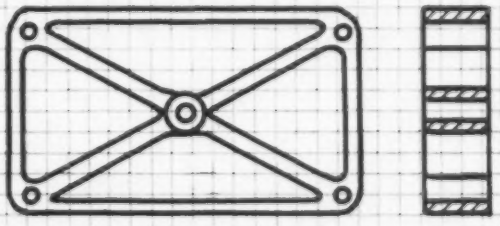


Min. dimensions for best alloys



DESIGN DETAILS FOR THREADS AND SERRATIONS





Avoid thick solid sections. Location of holes is difficult when the section is thicker than twice the minimum hole diameter. Two methods show how to reduce the mass.

SUGGESTIONS FOR RELIEVING THICK, UNIFORM WALL AREAS

DATA OFFERED IN THIS MONTH'S ADS

the Reader Service Cards on the facing page will get you these free reference materials. Circle the numbers and mail.

6. Die Casting Trim Presses — and die casting machines, that will meet your exacting requirements, are described in literature from B & T Machinery Company.

8. Sintered Powder — products; their composition, manufacture and application, are discussed in a 24-page engineering handbook from Bunting Brass & Bronze Co.

10. Small Die Casting Machines — A brochure from Cast-Master, Inc. gives details and specifications on two die casting machines: the 7Z for zinc, tin and lead; and the 7A for aluminum, magnesium and brass.

11. 800 Ton—die casting machine will produce castings up to 20 lbs. aluminum; 46 lbs. zinc. Complete specifications and technical data is available from Cleveland Automatic Machine Co.

12. High-Vacuum furnace — for lab and pilot plant is presented in Bulletin 4-30. Listed are complete specifications, accessories, and design features. Consolidated Electrodynamics Corp.

14. Standardized Die Components — which reduce design time and cut die construction costs, are described in a 170-page catalog published by The Detroit Mold Engineering Company.

18. Small Die Castings — An informative bulletin published by Gries Reproducer Corp. explains their 'Intercast" method of producing zinc-alloy parts with moving elements in a single automatic operation.

20. Zinc Alloy Facts —"Reference Book and Guide on Zamak (Zinc Base) Die Casting Alloys", offered by Henning Brothers & Smith, Inc., gives valuable production and design data.

24. Fully Automatic — die casting machine, that will give up to 1,500 shots per hour without an operator, is described in the "RAM Automatic" booklet from the DCMT Sales Corp., a Division of British Industries Corp.

25. High Melting Rates — are provided by Inducto Push-Out furnaces. Complete information is available from Inductotherm Corp.

27. Wax Injectors — Complete specifications and features of three models of all-hydraulic wax injection machines are available from Leyden Hydraulics, Inc.

30. Compacting Presses — Hydraulic and mechanical models in capacities from 10 tons to 500 tons are presented in an illustrated catalog from Kux Machine Co.

31. Induction Heating Data — 36 illustrated pages, in the Lepel High Frequency Laboratories, Inc. catalog, furnish technical data on the company's line of induction heating equipment.

Die Casting —"Latrobe Castings" tells the story of the Latrobe reputation for workmanship, service and economy on both small and large quantity production runs. A copy of this booklet may be obtained by writing on company letterhead to: Latrobe Die Casting Co., Latrobe, Pennsylvania.

33. Die Casting Machines—Information on a complete line of die casting machines is available from Lester-Phoenix, Inc. The machines feature reliable clamping, and are readily adapted to vacuum die casting.

37. Split Thrust Bearings — which save space and weight, and hold against rotation and high thrust are presented in an illustrated folder and data sheet. National Molded Products, Inc.

40. Cutting Costs — with brass powder metallurgy. This is the theme of a booklet evaluating this modern production method in terms of particular needs. The New Jersey Zinc Company.

43. Sintering Savings — A brochure entitled, "How to Cut Costs With the Remet Powdered Metal Process", is available from Reese Metal Products Corp.

44. Compacting Presses — Technical information on the complete line of industrial compacting presses handled by the F. J. Stokes Co., is available.

46. Fire Prevention Data — A new booklet entitled, "Ucon Hydrolubes Spell Safety", gives all the facts on these fire-resistant fluids, which eliminate the common fire hazards connected with hydraulic operations. Union Carbide Chemical Co.

47. Vacuum Degassing — in die casting die steels. A bulletin from Universal-Cyclops Steel Corp. explains this new melting technique and the company's facilities for tool steel degassing.

48. Piston Lubricator — Illustrated folder describes the Dorsey automatic piston and cylinder lubricator for aluminum cold chamber die casting machines. Westbrook Mfg. Company.

49. Finishing Non-Ferrous Metals — Detailed laboratory and engineering reports on the finishing of non-ferrous metals by the "Iridite" process are available from Allied Research Products, Inc.

50. Chromate Color Coatings — for zinc-plated small parts are described in literature offered by the Chemical Corporation.

51. Die Grinding — Brochure describes capabilities of the "Visual Grind" system in the construction of precision high-production dies, dies for powder metallurgy, lamination dies and special purpose dies. Cleveland Grinding Machine Co.

52. Flat Finishers — for grinding, polishing and deburring in one operation are presented in technical literature from Hammond Machinery Builders, Inc.

54. Vacuum Die Casting — Literature on vacuum die casting and information on the Premier Die Casting ing Company's facilities for producing custom die castings is available from the company.

57. Contact Wheels — and rubber rolls, in all sizes and coverings, are listed in the Chicago Rubber Company, Inc. catalog.

58. Die Casting Machines — A line of low-cost, hydraulic high speed equipment is described, with specifications, in a folder from American Die Casting Machinery Co.

59. Finishing Equipment — Grav-i-Flo Corporation offers price lists on their two compartment tumble finishing machines. The sizes are: 48", 36", 32" and 24".

60. Spin-Finishing—Information on one-operation pre-plating finishing of brass, zinc-base and aluminum die-cast parts, is available from Grav-i-Flo Corp. The process is said to produce surfaces and lustre equal to or surpassing that of buffing.

62. Investment Casting—An illustrated brochure from Hitchiner Manufacturing Company, presents information on how you can utilize the freedom and savings offered with investment casting.

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- ☐ Permanent Mold Castings
- ☐ Plaster Mold Castings
- ☐ Shell Mold Castings
- ☐ None of these

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4	21	38	55	72	89	106	123	140	157	174	191	208	225	242	259	276	293
5	22	39	56	73	90	107	124	141	158	175	192	209	226	243	260	277	294
6	23	40	57	74	91	108	125	142	159	176	193	210	227	244	261	278	295
7	24	41	58	75	92	109	126	143	160	177	194	211	228	245	262	279	296
8	25	42	59	76	93	110	127	144	161	178	195	212	229	246	263	280	297
9	26	43	60	77	94	111	128	145	162	179	196	213	230	247	264	281	298
10	27	44	61	78	95	112	129	146	163	180	197	214	231	248	265	282	299
11	28	45	62	79	96	113	130	147	164	181	198	215	232	249	266	283	300
12	29	46	63	80	97	114	131	148	165	182	199	216	233	250	267	284	301
13	30	47	64	81	98	115	132	149	166	183	200	217	234	251	268	285	302
14	31	48	65	82	99	116	133	150	167	184	201	218	235	252	269	286	303
15	32	49	66	83	100	117	134	151	168	185	202	219	236	253	270	287	304
16	33	50	67	84	101	118	135	152	169	186	203	220	237	254	271	288	305
17	34	51	68	85	102	119	136	153	170	187	204	221	238	255	272	289	306

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4	21	38	55	72	89	106	123	140	157	174	191	208	225	242	259	276	293
5	22	39	56	73	90	107	124	141	158	175	192	209	226	243	260	277	294
6	23	40	57	74	91	108	125	142	159	176	193	210	227	244	261	278	295
7	24	41	58	75	92	109	126	143	160	177	194	211	228	245	262	279	296
8	25	42	59	76	93	110	127	144	161	178	195	212	229	246	263	280	297
9	26	43	60	77	94	111	128	145	162	179	196	213	230	247	264	281	298
10	27	44	61	78	95	112	129	146	163	180	197	214	231	248	265	282	299
11	28	45	62	79	96	113	130	147	164	181	198	215	232	249	266	283	300
12	29	46	63	80	97	114	131	148	165	182	199	216	233	250	267	284	301
13	30	47	64	81	98	115	132	149	166	183	200	217	234	251	268	285	302
14	31	48	65	82	99	116	133	150	167	184	201	218	235	252	269	286	303
15	32	49	66	83	100	117	134	151	168	185	202	219	236	253	270	287	304
16	33	50	67	84	101	118	135	152	169	186	203	220	237	254	271	288	305
17	34	51	68	85	102	119	136	153	170	187	204	221	238	255	272	289	306

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SUBSCRIPTIONS to PMM are free if you are 1) management, engineering or purchasing personnel in a plant that 2) produces or uses precision metal molded parts. Just fill out this order card COMPLETELY and mail it.

These two Reader Service cards will bring you copies of any literature offered or described in this issue. To use them:

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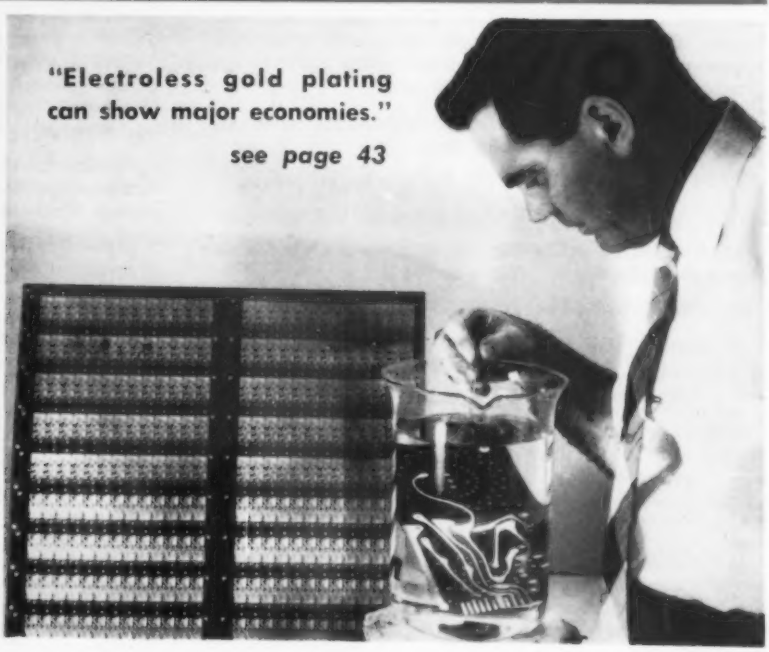
PMM Finishing Section

The specialized finishing methods, equipment and materials used to machine, assemble, surface condition or surface coat precision metal molded parts are presented here. This includes all secondary operations which convert a raw casting to a finished product.

"Electroless gold plating can show major economies."

see *page 43*



(Advertisement)

SPECIAL REPORTS ON FINISHING NON-FERROUS METALS

NUMBER I—Decorative, Corrosion-Resistant Finishing with Iridite

Chromate conversion coatings are well known and accepted throughout industry as an economical means of providing corrosion protection, a decorative finish or a good paint base for non-ferrous metals. However, continued developments are so rapid and widespread that many manufacturers may not be completely aware of the breadth of application of this type of finish. Hence, this digest of current information; to bring you up to date on the many ways in which you can combine salable appearance with durability in one finish at a competitive price advantage. Report II on paint base, corrosion-resistant finishes and Report III on chemically polished, corrosion-resistant finishes are available on request.

First, as a basis for this discussion, a "decorative" finish is considered as any chromate film that is used as a final finish in itself. It may be truly decorative in that its sole purpose is to enhance the beauty of the product. For example, a bright chrome-like finish or a pleasing bronze appearance are among the many effects that can be obtained. It may be functionally decorative in that it reduces reflectivity for camouflage purposes or provides a means of color-coding parts. But, in all cases, the Iridite films protect the metal against corrosive attack.

Iridite finishes are now available for all commercial forms of the more commonly used non-ferrous metals, including zinc, cadmium, aluminum, magnesium, silver, copper, brass and bronze. These films can produce a wide variety of pleasing appearances. The basic colors of the Iridite coatings are grouped below by metals.

ZINC and CADMIUM: Metallic bright, light iridescent, iridescent yellow, bronze, olive drab.

COPPER, BRASS, BRONZE: Metallic bright, yellow.

ALUMINUM ALLOYS: Clear, iridescent yellow, brown.

MAGNESIUM ALLOYS: Metallic bright, iridescent yellow-red, brown.

SILVER: Metallic bright.

In addition, many films can be modified by bleaching or by dyeing. Among the dye colors available are various shades of red, yellow, green, blue or black.

Depending upon the metal and the Iridite used, corrosion resistance of clear and bright films ranges from mild passivity to as high as 500 hours in salt-spray; on heavier dark films, salt-spray resistance ranges from approximately 100 to 1000 hours.

It is this combination of decorative and corrosion resistant properties that accounts for the widening use of Iridite finishes. For example, Iridites #4-73 and #4-75 (Cast-Zinc-Brite) make possible for the first time, a combination of lustrous chemical polishing of the as-cast surface of zinc die castings and good resistance to corrosion. Further, in many cases, sizeable savings in the cost of buffing and electroplating are realized.

WHAT IS IRIDITE®?

Briefly, Iridite is the tradename for a specialized line of chromate conversion finishes. They are generally applied by dip, some by brush or spray, at or near room temperature, with automatic equipment or manual finishing facilities. During application, a chemical reaction occurs that produces a thin (.00002" max.) gel-like, complex chromate film of a non-porous nature on the surface of the metal. This film is an integral part of the metal itself, thus cannot flake, chip or peel. No special equipment, exhaust systems or specially trained personnel are required.

On many steel parts, a simple system of zinc or cadmium plate and bright Iridite is used instead of more costly electroplated finishes to provide a bright, decorative and protective finish with tremendous savings in material, equipment and labor.

In finishing aluminum, where corrosion resistance or paint adherence is the prime consideration, the aircraft industry has all but abandoned the anodizing process in favor of recently developed chromate conversion coatings, among them Iridite #14 and #14-2 (Al-Coat). These formulations and their method of application can be varied to retain the original metallic appearance while providing acceptable corrosion resistance, or to produce a fully colored brown finish that offers exceptional corrosion protection. Again, time and manpower savings are astounding—one company saved at least $15,000 a year on maintenance of racks alone and another $40,000 on materials and labor in only nine months. In addition, of course, hundreds of thousands of dollars are saved by eliminating the need for expenditures for generators, heating equipment and racks.

Iridites are widely approved under both Armed Services and industrial specifications because of performance, low cost and savings of materials and equipment.

In planning or designing, you should consider the many other characteristics of Iridite finishes which may enter into the specific problem. In addition to having decorative and protective functions, these chromate coatings form an excellent base for organic finishes and bonding compounds. They have low electrical resistance. Some can be soldered and welded. The Iridite film itself does not affect the dimensional stability of close tolerance parts.

You can see then, that with the many factors to be considered, selection of the Iridite best suited to your product requires the services of a specialist. That's why Allied maintains a staff of competent Field Engineers—to help you select the Iridite to make your installation most efficient in improving the quality of your product. You'll find your Allied Field Engineer listed under "Plating Supplies" in your classified telephone book. Or, write direct and tell us your problem. Complete literature and data, as well as sample part processing, is available. Allied Research Products, Inc., 4004-06 E. Monument Street, Baltimore 5, Maryland.

For more information circle No. 49 on the Reader Service Card

SIMPLE, INEXPENSIVE, EFFECTIVE—the advantages of a new method of gold plating.

Non-Electric Gold Plating

BY HAROLD ROBINSON*

A NEW gold-coating process saved $600 a day for an electronic-components manufacturer.

A firm that decorates trophies with gold saved more than 20% of its electroplating costs.

The Atomex process needs no current or special equipment. You simply put the objects to be coated in a bath and they come out with a denser, more permanent coat of 24-carat gold than they could have gotten by electroplating. The process works by ionic displacement. Attacked chemically, the base metal surface sheds atoms into the bath, takes back atoms of gold from the bath. Coatings up to 10 millionths thick can be applied to most metals.

This non-electric plating process is better in six ways:

1. The coatings are thinner, denser, with the same properties as electroplates, but with 35% less gold.
2. There's no electrical shielding, no low-or high-density areas. All parts of the object, even blind recesses and the inside of tubes, receive a uniform coating.
3. The gold is atomically bonded to the base metal. This is a much firmer bond than you get with electroplating.
4. There's no build up of free carbonate or cyanide, so analytical control of the bath isn't needed.
5. All of the gold is used up. Spent solution is thrown away.
6. Because no electrical connections are needed, discontinuous surfaces can be plated.

It was primarily this last advantage which gave an electronic components manufacturer a big saving. This company plated unconnected wires imbedded in glass. The change in plating method showed a saving of $40.00 per 1000 units. They make about 15,000 units a day so the saving amounts to $150,000 a year.

A decorative plating firm used to buy 14 oz. of potassium gold cyanide a week. This amounted to 8.4 troy ounces of gold. The material cost was $337.40 per week. Now, with non-electrical plating, they buy 6 troy ounces of gold (in the master solution) per week. The saving, more than $3600 per year for material and 3 man-hours per day labor. Other companies doing similar work report about the same relative savings.

Theoretically, all metals below gold in the electromotive series should be replaceable by gold deposit. The Atomex process is successful on copper and copper-base alloys and on such diverse materials as cadmium, zinc, nickel, iron monel, Woods metal, nickel-silver, type metal, soft solder, pewter, Alumel, cobalt and bismuth alloys. Probably it can be used on others.

Plating by this process is easy. Clean the parts as always and then put them in the bath. No precise control is needed on any metals except copper. pH is not important nor is temperature. The thickness of the deposit depends on time, type of metal and bath temperature. Copper and a few special alloys require more careful control, but it's still easy.

*ELECTROCHEMIST, CHEMICAL DIV., ENGELHARD INDUSTRIES, INC.

TED HAHN NAMED MANAGER OF STOKES' ROCHESTER SALES OFFICE

F. Theodor Hahn, who has been a field sales engineer for the company in Upstate New York for the past year and a half, has been appointed manager of the Rochester sales office for F. J. STOKES CORP.

He will represent the complete line of Stokes automatic production machinery, which includes pharmaceutical tabletting presses, powder metal compacting presses, and ceramic and industrial tabletting presses; automatic equipment for both compression and injection plastics molding; and a wide range of high vacuum processing equipment, including vacuum induction melting, vacuum stream degassing of molten metals, vacuum heat treating, vacuum metallizing and coating, vacuum drying and impregnation, and freeze drying, as well as a complete line of mechanical and diffusion vacuum pumps, valves, and gages.

TECHLINE DIVISION OF WHEELABRATOR CORP. APPOINTS REPRESENTATIVES

Appointment of sales representatives for the TECHLINE DIVISION, WHEELABRATOR CORP., has been announced by George H. Lieser, field sales manager of the new division which handles the manufacture and sale of barrel finishing equipment, media and compounds and wet blasting equipment and abrasives.

The representatives are Charles William Thomas, Arcadia, Calif., Richard Dale Taylor, Phoenix, N. Y., Ruel K. Shumway, St. Louis, Mo., Donald H. Schultz, Elm Grove, Wisconsin, and the Industrial Sales and Engineering Company, Inc., Kalamazoo, Michigan.

J. S. SMART, JR. APPOINTED GENERAL SALES MANAGER OF ASARCO

John Stuart Smart, Jr. has been appointed General Sales Manager of American Smelting and Refining Co., it has been announced by Simon D. Strauss, Asarco's Vice President in charge of sales. Ralph L. Wilcox, well known in die casting, has been named Assistant Sales Manager.

Working directly with Mr. Strauss, Mr. Smart will be responsible for the administration of the Sales Department and for the sales of the Company's major metal products and the by-products of primary metal smelting and refining.

MUSMANNO PROMOTED TO ADVERTISING MANAGER

Victor N. Musmanno, who joined the company as assistant advertising manager in May, 1957, has been promoted to advertising manager of F. J. STOKES CORPORATION. He succeeds Walter E. Rayher, who has resigned.

Before joining Stokes, Mr. Musmanno had been for three years advertising manager of Stokes & Smith, Philadelphia, a division of Food Machinery and Chemical Corporation. Prior to this, he had been assistant advertising manager of the A. B. Farquhar Division of the Oliver Corporation, in York, Pa., and production manager of the W. H. Long Co., an advertising agency in York.

SPOTH NEW MANAGER OF KOLCAST INDUSTRIES

Nelson G. Spoth today was named Manager of KOLCAST INDUSTRIES, A DIVISION OF THOMPSON PRODUCTS, INC.

Thompson's Operations Vice President H. A. Shepard announced that Mr. Spoth would succeed Lewis R. Schilling, founder of Kolcast, who has resigned.

Mr. Spoth, who has been active in the sand and investment casting industry for more than 15 years, said he visualizes an ever-expanding investment casting field.

GRIND...POLISH...DEBURR in one operation with Hammond FLAT FINISHERS

For fast, uniform, economical finishing of flat work such as sheets, bars, strips, stampings and extrusions with one machine, one operator and one pass.

AUTOMATIC AIR TENSIONING: maintains correct tension on abrasive belts and conveyor belt • **VARIABLE SPEED CONVEYOR:** rate of feed is adjustable from 0 to 60 FPM • **WORK HOLDERS:** hold-down rolls, electro-magnetic platen and various types of conveyor belts • **AMMETER CONTROL:** an ammeter for each head allows operator to determine and maintain the polishing pressure necessary for a uniform finish and longer belt life • **V-BELT DRIVE:** allows abrasive belt speed to be changed to suit the work • **MICROMETER DIAL:** controls heads for required depth of cut.

Write for literature today.

1 TO 6 HEADS 6" to 12" WIDE

Hammond Flat Finishers are available in 6", 8", 10" and 12" widths — handle work up to 6" high

SEND SAMPLES
Send us one finished and several rough samples. You will receive a complete Engineering Report and Production Analysis without obligation.

Hammond Machinery Builders INC.
1642 DOUGLAS AVE. • KALAMAZOO, MICHIGAN

For more information circle No. 52 on the Reader Service Card

1 CORROSION TEST panels of magnesium. Left, clear anodized plus varnish; right, varnish over bare metal. Exposure, 510 hours in standard 20 percent salt spray.

Good protection with metallic appearance by . . .

Clear Anodizing Magnesium

Where can this new treatment be used? On any magnesium part such as die castings, permanent mold castings, sand castings, extrusions, forgings and fabricated sheets.

MAGNESIUM products that were anodized for corrosion protection have always been a dirty yellow or green color. The metal was protected, and the anodic coating was a good paint base, that's all. When a metallic appearance was wanted a coat of clear varnish was put on the bare metal. This looked good for a time but let corrosion start soon.

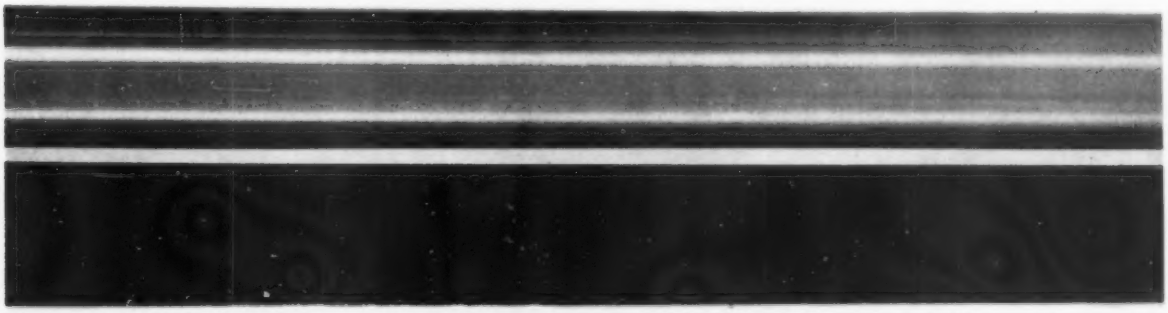
A new anodic treatment has been developed by the Dow Chemical Co. The new finish gives the same protection as the older D-17 process but leaves the metal without surface discoloration. The startling difference in appearance is shown in figure 2.

For the best appearance, a clear varnish overcoat should be put over the anodized surface. The varnish can be tinted, an added advantage. By using dyes in the overcoat a transparent effect in almost any color can be gotten. The colors don't fade and are not washed out by detergents.

How is this anodic coating applied? In the same bath as the D-17 treatment, but at 40 volts instead of 70 to 90 volts. Here's SOP for applying the coating.

1. Buff the part with a 320 grit abrasive. This gives lustre.
2. Alkali clean for 3 to 10 minutes, cold-water rinse.
3. Anodize for 1 minute in a D-17 bath at 40 volts D.C.
4. Cold water rinse.
5. Hot water rinse.
6. Lacquer or varnish (typical treatment: spray on lacquer, bake 20 minutes at 250°F.

How does this coating stand up? Look at figure 1. Compare the anodized and varnished surfaces with varnished surfaces only.



2 GOOD METALLIC APPEARANCE results from clear anodizing plus varnish overcoat on extruded magnesium tubing, top, while Standard Dow 17 coat is dull green, bottom. Varnish may tinted, if desired.

NEW APPOINTMENTS AT C. I. HAYES, INC.

Recent appointments announced by C. I. HAYES, INC. are: Walter H. Clemons as sales engineer. He will assist in the sales and design of electric heat treating furnaces. Andrew Syska as research engineer, and Thomas L. Case as assistant to the chief engineer in design, engineering and construction.

NEW SALES MANAGER AT WEST INSTRUMENT

Ardmore M. Willer, 31, has been appointed Sales Manager of WEST INSTRUMENT CORP., Chicago manufacturer of temperature control and recording instruments, it was announced by President William C. West, Jr.

Willer studied engineering at University of Illinois and Illinois Institute of Technology, joined West seven years ago and has been serving as assistant sales manager.

THOMAS NAMED VICE PRES. GENERAL SMELTING CO.

The appointment of T. Lewis Thomas, III, as a vice president of GENERAL SMELTING CO. was announced today by John N. Pomeroy, Jr., president.

Thomas, formerly purchasing manager of General Smelting, will assume his new duties immediately, Pomeroy said. Thomas joined General Smelting Co. in 1948.

TUMBLE GRAV-I-FLO FINISH

OFFERS

Spin-Finish

Replaces hand and automatic buffing!

- One-operation finishing of most complex parts
- Completely dry process . . . no lubricants
- Dust and fume free . . . no exhaust systems
- No set-up time required

Wipe the slate clean of all present concepts of speed, efficiency and costs in pre-plating finishing of brass, zinc-base and aluminum die-cast parts! In one short, automatically-timed operation—and on a *multiple mounting* of parts—new SPIN-FINISH produces surfaces and lustre equal to or surpassing that of buffing. Write for information.

GRAV-I-FLO CORPORATION

Dept. PMM-12, 400 Norwood Avenue, Sturgis, Michigan

For more information circle No. 60 on the Reader Service Card

ALLOY PRECISION CASTING CO. MOVES

ALLOY PRECISION CASTING CO. has suspended operations in its Cleveland, Ohio foundry to concentrate all manufacturing on the west coast. All present customers will be served by the Mercast Mfg. Corp. A regional sales office will be maintained in Cleveland under the direction of Walter S. Poremba.

INVESTMENT CASTING INSTITUTE MEETS

The Investment Casting Institute, trade association of the investment casting industry, held its annual fall meeting in New York November 11, 12, 13. The meeting featured a management conference aimed at explaining why a strong management policy with properly delegated authority is essential for the successful operation of even a small business.

Another session of the meeting discussed cost accounting and sales management and practices.

Officers for the coming year were elected at this meeting. They are: R. R. Miller, Precision Metalsmiths, Inc., president; John H. Morison, Hitchiner Mfg. Co., Inc., vice president; K. W. Thompson, K. W. Thompson Tool Co., treasurer; E. A. Democh, York Castings, Inc. and J. Keverian, General Electric Co., directors.

NEW DIE CASTING COMPANY FORMED

Through the consolidation of three separate companies under a single management a new, completely integrated die casting organization has been formed. The new facility, HARTZELL MFG., INC., is a combination of Lloyd Products, Inc., an established die casting company; Mitee Mfg. Co., a company who have specialized in machining and finishing die castings; and Production Engineering Co., a tool and die shop.

The new company will be headed by Thomas S. Hartzell, pres. In addition to the combined service of the three forming companies, Hartzell Mfg. Inc. will offer an experienced engineering service to aid customers in the design of products for the best and most economical method of manufacture.

LETTERS

Continued from page 24

INVESTMENT CASTING

We are interested in laboratory size equipment to do investment casting. We wonder if you could furnish us with the names and addresses of the people who are manufacturers of both direct and indirect arc investment casting furnaces and induction type melting furnaces.

We also would like any possible source of second hand equipment in this field. Is there any publication that lists used equipment in the foundry field.—A.H.K., Jr., pres.

Most companies who make equipment for the investment casting industry have a wide enough range of sizes so that some, at least, can be used for laboratory work. Also, the companies who specialize in dental laboratory supplies can furnish small scale equipment. As far as we know there is no active market in used investment casting equipment, but we have sent the reader a copy of the Investment Casting Directory published by this magazine last June. This directory lists all of the makers of new equipment. —Ed.

ALLOYS & CHEMICALS APPOINTS DISTRICT MANAGER

The appointment of K. Herron to the position of Cleveland District Sales Manager for ALLOYS & CHEMICALS MFG. CO., was announced recently by N. L. Butkin, president. Herron will be responsible for all A & C aluminum and zinc alloy ingot sales and service to diecast, permanent mold, and sand foundries, and steel mill installations in the Cleveland District.

KAISER NAMES EAST COAST DISTRIBUTOR

THE GEORGE L. SALL CO., INC., Philadelphia non-ferrous metals smelters, has been named an East Coast distributor for KAISER ALUMINUM AND CHEMICAL CO. The Sall Co. will carry the complete line of Kaiser alloys. The company will use its present marketing organization to reach diecasters, permanent mold casters and sand casters within a 500 mile radius of Philadelphia. Until this time, Sall has specialized in the production and sales of smelters aluminum, brass and bronze and zinc alloys.

FREE BROCHURE shows How You Can CONTOUR GRIND Dies for POWDER METALLURGY!

IMPORTANT TO YOU!

Free booklet tells how VISUAL GRIND facilitates construction of precision high-production dies, dies for powder metallurgy, lamination dies and special purpose dies. VISUAL GRIND permits through, blind and templet grinding . . . permits continuous inspection by magnifying work from 10:1 to 100:1 . . . upgrades semi-skilled labor . . . permits easy maintenance of dies in your own plant . . . reduces costly down time. VISUAL GRIND COMPLETES YOUR TOOL ROOM.

Visual Grind solves the problem in mind

Intricate grinding jobs like those shown above ordinarily involve several machines. ALL WERE FORM GROUND ON A SINGLE VISUAL GRIND.

CLIP and MAIL THIS COUPON TODAY

The CLEVELAND GRINDING MACHINE Co.

1710 EDDY ROAD • CLEVELAND 12, OHIO

Please send me the free brochure describing the capabilities of the VISUAL GRIND.

Name ..... Title .....

Company .....

Address .....

City ..... State .....

For more information circle No. 51 on the Reader Service Card

CASTING PLANT

continued from page 37

die casting machine or the gates of castings may be loaded into baskets and transported by fork truck to a separate trim line. Most of the trim presses are hydraulically operated units made by Clearing Machine Company.

All die castings are shipped as trimmed, no machining at all is done in this plant.

The permanent mold casting area contains 36 piston casting molds and 4 transmission casting machines. Because high rates of production are necessary, the permanent mold machines are all hydraulically or pneumatically operated. The only hand work required is to pour the metal and remove the cast part. All of these permanent mold casting machines were built for this plant by Permanent Mold Die Co. The 36 piston machines turn out 50,000 pistons per day in nine different weights and/or designs. From the casting machines the pistons go to a specially designed saw where the gate and overflows are cut-off. Next is a rough turning on Baird Chucking machines where the face and OD are turned on automatic machines.

Because piston balance is so important in today's engines, the rough machined pistons are 100% inspected for weight. At total tolerance of only 15 grams (about ½ ounce) is allowed. Overweight pistons may be salvagable, but under weight ones go into remelt. Scrap loss is 2% to 3%.

The transmission case is the largest casting now made at Sheffield, it weighs about 24 pounds after trimming. This part is cast in a three piece mold.

Through both the Ford and Reynolds plants there is constant emphasis on quality control. No metal leaves Reynolds which has not been carefully checked for composition and freedom from included dross, oxide or other nonsoluble contaminants. A further check by spectrographic analysis is made by Ford after the metal has been further alloyed and refined. Quality control through every step of casting and trimming lets the plant operate at an extremely low overall rejection rate.

While Reynolds is now expanding, particularly in their rolling and press blanking operations, very little expansion is currently planned at Ford. A Reed-Prentice Vac-u-cast machine is on order for development work in vacuum die casting and the company is contemplating the addition of a 1200 ton die casting machine to study casting of very large parts. Neither of these machines will be for production work.

America looks to . . . Hammond
for
FINISHING
and
DEBURRING
"KNOW-HOW"
The experience gained in over 70 years of machinery building has provided us with a big bank of "Know How."
This knowledge is drawn upon and added to every day. Our business is to share it with you to bring down high finishing costs. Many users of Hammond Automatics have found more efficient means of finishing by drawing on our bank of "Know How."
The Rotary Automatic illustrated represents one of our many types and sizes of automatic finishing machines for either continuous rotation or indexing. The head and stand units shown are a part of a large "family" which range in type and size up to 20 HP.
SEND SAMPLES and we will show you how much you can speed up production and cut costs.
Hammond Machinery Builders INC.
1642 DOUGLAS AVE. · KALAMAZOO, MICH.
For more information circle No. 53 on the Reader Service Card

VACUUM MELTING CAPACITY INCREASED

A major expansion in its vacuum melting capacity has been announced by LATROBE STEEL CO. The enlarged melting capacity will allow a considerable increase in the production of super alloy steels.

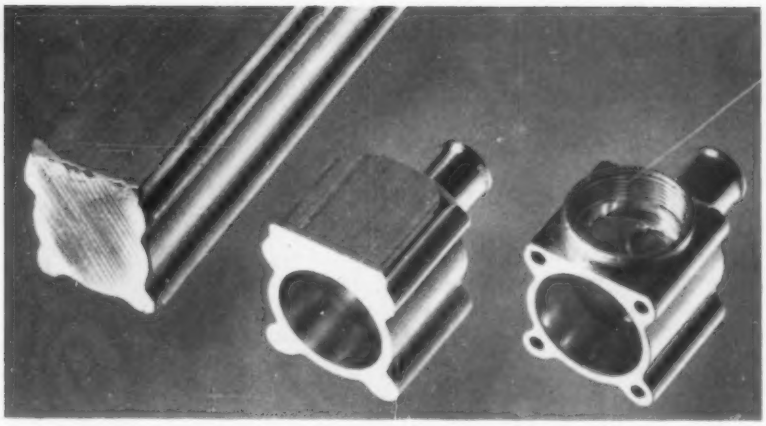
The new furnace is a consumable electrode vacuum melting unit to be built by the Lectromelt Furnace Div., McGraw-Edison Co. Operation of the new furnace is expected to start early in 1959.

NEW INVESTMENT CASTING FIRM FORMED

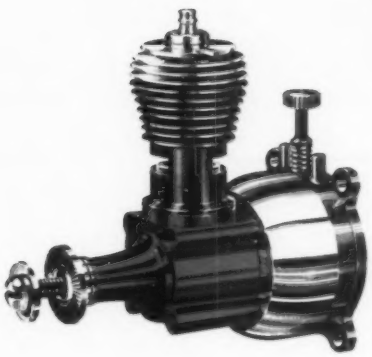
A new investment casting foundry, INDEPENDENT STEEL CASTING CO., INC. has recently been organized.

The company will produce both ferrous and non-ferrous castings, including stainless steels, alnico materials and other special alloys.

Officers of the new company are: Dan J. Duffy, president and Owen W. Hale, general manager. The company has had experience in the manufacture of investment castings since 1940.



START WITH AN EXTRUDED bar and with simple machining operations get a quality end product. Higher cost, but worth it.



BETTER QUALITY justified the increased cost of an extrusion instead of a casting for the crank-case.

Extrusions Lower Model Costs

"These extruded crankcases cost slightly over two cents more than comparable cast ones. But, they're worth the extra cost." That's the view of L. M. Cox. He owns the L. M. Cox Manufacturing Co., manufacturers of the Thimble Drome model airplane gasoline engine.

The crank case is a critical component of the engine. The part must be light, yet able to withstand many crash landings. The model airplane industry always has cast, then machine finished the crankcases. For many years Cox did the same as the others, buying castings from first one job shop and then another.

When he finally got to the point of having to reject 75% of the castings, Cox became interested in extrusions. The chief difficulty with cast parts was that too few custom casters were able to meet the specifications. They called for exceptionally thin walls and high quality control.

Today all Cox's engines have crankcases fabricated from extruded aluminum. The extrusion gives the precise shape to the outside of the crankcase. After cutting to length, one side of the extrusion is machined to produce a circular collar into which the engine cylinder is threaded. Then one end of the extrusion is machined to house the propeller shaft. The other end is machined for the attachment of the back plate.

After machining they tumble the parts to give them a brilliant finish.

Although the crankcase, as an extrusion, cost more the added cost is offset by:

1. No production loss waiting for replacement of casting rejects.
2. No rejects attributable to poor metal quality.
3. The extrusion is easily machined and takes an excellent finish.

The strength of the extruded stock indicated that in the future the crankcase can be made lighter. This can be done by reducing the shell dimensions of the extrusion, without sacrificing strength of the machined component. The crank cases illustrated are slightly heavier than those previously cast.

Cox once felt the only way he could use castings and still satisfy his ideas of quality control would be to install and run his own casting shop. The cost was prohibitive, because the volume was too small.

Extruding the cases offered an alternative that solved the problems of quality control at a reasonable price.

USEFUL LITERATURE, CATALOGS, MANUALS

any of these technical publications may be obtained by circling the appropriate numbers on the Reader Service Cards, Pages 40-41

PROCESSES

Die Casting: 153

DOLLIN CORPORATION—A 16-page illustrated brochure presents the company's die-making, foundry, engineering, and casting facilities for large or small production runs of zinc and aluminum die castings.

Vacuum Plaster Mold Castings: 154

UNIVERSAL CASTINGS CORP.—Technical brochure describes vacuum cast plaster mold castings that feature greater density in metal structure, intricate detail, thin sections, high physical properties, close dimensional tolerance and smooth surface finish.

Sintered Beryllium: 155

BRUSH BERYLLIUM CO.—"Fabrication of Beryllium" is the title of a technical paper that discusses the Available Forms of Beryllium; Structural Fabrication Techniques; and Beryllium Soldering Compounds. Numerous tables of properties are included.

Investment Casting: 156

CASTING ENGINEERS, INC.—The "Minicast" process of investment casting that features dimensional tolerances as close as plus minus 0.001" per inch, cross-sectional thickness as low as 0.020" and exceptional surface finish, is described in an illustrated brochure.

Sinterings: 157

SUPERMET DIV., GLOBE INDUSTRIES—"What you should know about Solid Parts From Powder" is the title of an informative brochure that lists the economy of powder metallurgy and design information.

Copper Investment Castings: 158

BRUSH BERYLLIUM CO.—The casting properties and the unusual combination of physical properties of beryllium copper are discussed in an illustrated bulletin.

MATERIALS & EQUIPMENT

Induction Melting: 159

AJAX ENGINEERING CORP.—An information sheet is available on the Ajax-Tama-Wyatt Twin Coil Core Type 60 Cycle induction melting furnace. The principles of operation are described with the help of a cut-away drawing.

Automatic Die Lubricators: 160

COLUMBUS AUTOMATIC LUBRICATION CO.—The Calco Automatic Die Lubricator, which is designed to apply all types of sprayable lubricants to the surfaces of forming dies, is described in an illustrated brochure.

Tool Steels for Dies: 161

CRUCIBLE STEEL CO. OF AMERICA — The second of a series of Tool Steel Clinic booklets contains an interesting section on factors to consider in choosing the proper steels for dies.

Copper-Alloy Powders Uses: 162

FEDERAL-MOGUL DIV., FEDERAL-MOGUL-BOWER BEARINGS, INC. — A brochure highlights properties of low oxide copper alloys, and shows engine bearing halves, bi-metal bushings and thrust washers made from the alloy powders.

Sintering Furnace: 163

WESTINGHOUSE ELECTRC CORP. — Molybdenum element furnace sinters at temperatures up to 3100°F., was designed for use with hydrogen or dissociated ammonia atmospheres. Details are in descriptive bulletin 28-150.

Metal Powders Characteristics: 164

KEYSTONE CARBON CO. — Technical folder compares chemical composition and physical properties of powdered metal production grades. Materials are classified as ferrous, non-ferrous, those with magnetic properties, and stainless steel filter materials.

Zinc Data Books: 165

AMERICAN ZINC INSTITUTE, INC. — Revised basic text on zinc is entitled "Zinc — A Mine to Market Outline." 96-pages present in concise form a wide variety of fundamental data on zinc's history, sources, production, properties, and important applications.

Heat Exchangers: 166

AMERICAN-STANDARD, ROSS HEAT EXCHANGER DIV. — Illustrated Bulletin 302.5K1 introduces a new line of heat exchangers for process and general industrial uses. They are assembled from standard components to meet a wide range of requirements, eliminating the high cost of custom fabrication.

Casting Alloys Properties: 167

APEX SMELTING COMPANY — New revised brochure lists properties of aluminum, magnesium and zinc die casting alloys, includes the company's latest developments. Ingot composition, typical mechanical properties and physical constants are tabulated in each alloy classification as a ready reference for designing and die casting engineers and buyers.

Die Grinding: 168

THE CLEVELAND GRINDING MACHINE CO. — Brochure highlights capabilities of the "Visual Grind" system of continuous inspection grinding for making precision high-production dies, dies for powder metallurgy, lamination dies and special purpose dies. A complete parts, accessories, and price list is also available.

Titanium Powder: 169

UNITED INTERNATIONAL RESEARCH, INC. — The history, properties, and uses of titanium powder are presented in an informative 4-page booklet.

continued on page 52

ANOTHER INDUCTO INSTALLATION...

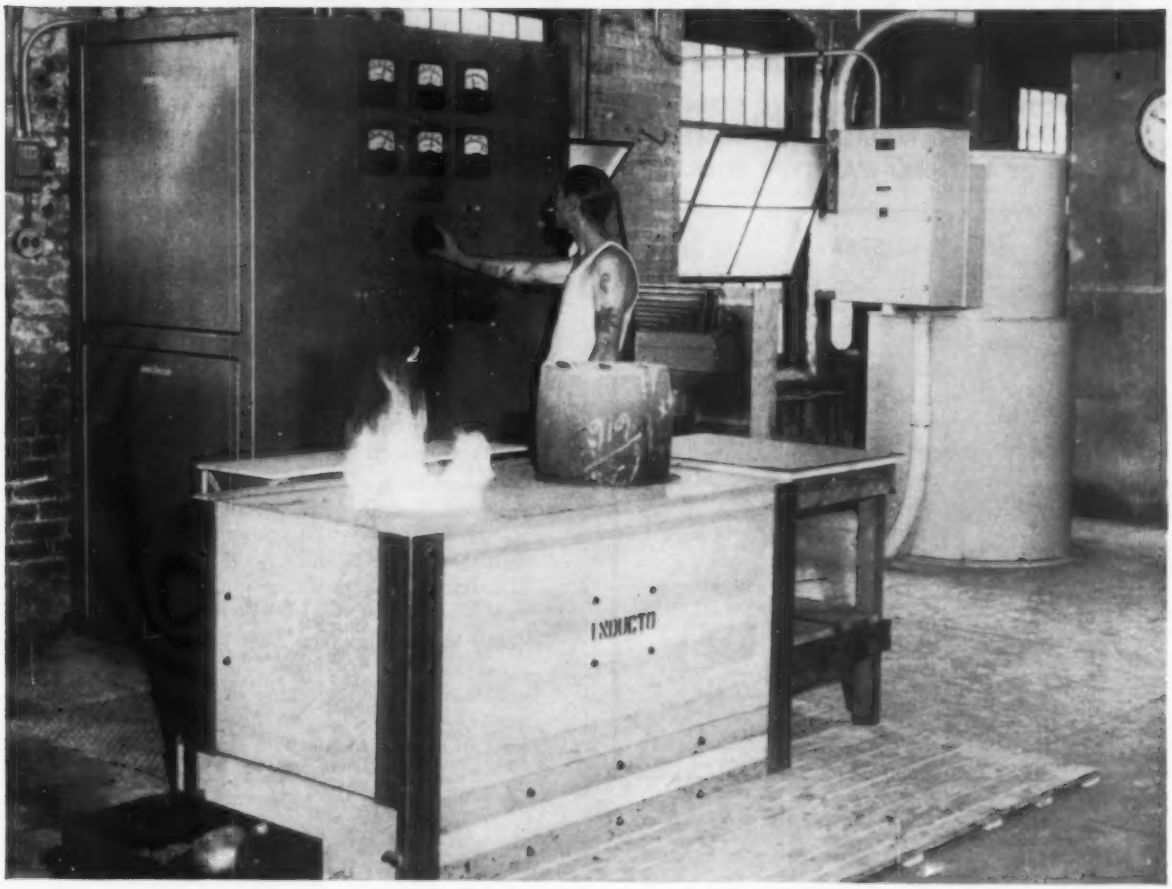


PHOTO COURTESY OF BUSHINGS, INC., PHILA. 32, PA.

The Foundry and the Feather Duster

Shortly after Bushings Incorporated, a Philadelphia manufacturer of cast bronze bushings and bearings, replaced four oil-fired furnaces with an INDUCTO Push-Out induction furnace, the management received a strange request . . . the foundrymen wanted a feather duster. They liked the INDUCTO furnace and control so much, and were so pleased with the cooler and cleaner foundry, that they wanted a feather duster to keep the equipment clean.

And the management was pleased too! For in addition to happier and more productive employees, they gained other benefits. The higher melting speeds and precision control of the INDUCTO Push-Out furnace helped reduce metal losses. In addition, it became possible to reclaim metal from melts and machining. Production time was saved in the handling of crucibles and the transferring of melts. In fact, the one INDUCTO Push-Out furnace provided as many melts in six hours as the four oil-fired furnaces did in eight.

Why not learn for yourself how INDUCTO furnaces and precision control can help modernize your foundry and save production dollars? Write today for more complete details.

INDUCTOTHERM CORPORATION
INDUCTO

INDUCTOTHERM
corporation

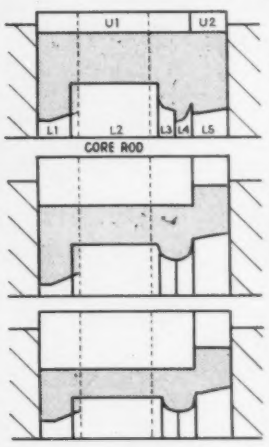
412 Illinois Ave. Delanco, N. J.

For more information circle No. 25 on the Reader Service Card

PRESSES FOR

PRODUCTION BRIQUETTING AND COINING OF POWDERED MATERIALS INTO COMPLEX SHAPES BY WITHDRAWAL TYPE TOOLING

RIFLE SEAR



1. Initial pressing position. Independent punch adjustment for correct fill height.
a. Two upper punches
b. Five lower punches
c. One core rod

2. Intermediate pressing position. Independent movement of lower punches results in proper flow of powder and uniform density throughout.

3. Final pressing position. Double pressed and sintered properties:

Tensile	— 57,000 psi
Yield	— 46,000 psi
Elongation	— 15%
Density	— 7.3 g/cc

4. EJECTION: Die stripped from compact which rests on the unmoving bottomed lower punches.

Is tooling limiting your ability to produce a part like the above to close tolerances and uniform density? A. Johnson, suppliers of HVA Electrolytic Iron Powder, now offer outstanding European Compacting Presses featuring rugged but simple design, extra large size die cavity, ease of set-up, and economy of purchase and operation. Press capacities are available in sizes between 6.5 and 1100 tons.

	Soenen Model No. 200T-50	Spiertz Model No. K2C100sp
Capacity	220 tons	1100 tons
Motor horsepower	25	25
Strokes per minute	7-20	5-18
Upper ram stroke	7-7/8"	11.81"
Upper ram adjustment	3-5/16"	0.59"
Lower ram stroke	6"	7.67"
Lower ram adjustment	4"	4"
Die fill height	6"	7-5/8"
Max. length of longest punch	7-1/2"	9-1/8"

We invite your inquiries concerning scheduled demonstrations of this equipment.

MEMBER METAL POWDER mpi INDUSTRIES FEDERATION

A. JOHNSON & COMPANY, INC.

21 WEST STREET • NEW YORK 6, N. Y.

For more information circle No. 28 on the Reader Service Card

USEFUL LITERATURE

continued from page 50

Wet Dust Collector: 170

WHEELABRATOR CORP. — An operating fact sheet is offered which explains in detail a new dust collector with no moving parts, no nozzles or pumps and delivers discharge air free of entrained water.

Retaining Rings: 171

RAMSEY CORPORATION — Details about new Circolox retaining rings, applicable to die cast parts assembly, have been made available. Units come in a variety of metals and in three types: internal, external and "E" ring for shoulders on small shafts.

Tungsten Carbide Products: 172

METAL CARBIDES CORP. — Facilities and manufacturing processes of this company are presented in a 24-page folder. A pictorial tour covers each operation in the plant from the reduction process to final product inspection.

Columbium Data: 173

FANSTEEL METALLURGICAL CORP. — Complete information on the unusual properties of Columbium is furnished in the January 1958 issue of "Fansteel Metallurgy." Facts about molybdenum and Fansteel 77, an alloy, are also given.

Sintered Metal Filters: 174

PERMANENT FILTER CORP. — Specifications and application data, engineering drawings and performance charts show how to solve tricky filtering problems in several media with sintered metal filters.

TUMBLE GRAV-I-FLO FINISH OFFERS

On tumble finishing equipment!

Grav-i-Flo again scoops the field with new lower prices for its standard line of finishing equipment and supplies. Now — gain Grav-i-Flo's experienced know-how plus lower prices — and *really* save! *Send for complete price lists* on 2 compartment machines in sizes 48", 36", 32" and 24"!

GRAV-I-FLO CORPORATION

Dept. PMM-12 400 Norwood Avenue, Sturgis, Michigan

For more information circle No. 59 on the Reader Service Card

Thermocouple Extension Wires: 175

THERMO ELECTRIC CO., INC. — Catalog No. 32 gives wire resistances, weights, electrical properties, insulation characteristics and other information on a line of thermocouple extension wires.

FINISHING

Rhodium Plating Data:

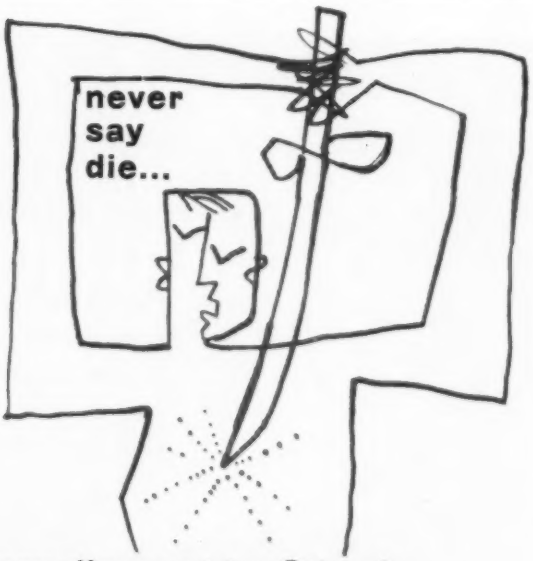
SEL-REX CORPORATION — A new 24-page booklet tells where, when and how to use Rhodium Electroplate for exacting industrial applications. The booklet gives a detailed analysis of advantages Rhodium Electroplate will provide in specific applications. A workable formula for computing the cost of the plating is included. Write on company letterhead to G. S. Corigliano, Sel-Rex Corporation, Nutley, New Jersey.

Tool Grinders: 177

HAMMOND MACHINERY BUILDERS, INC. — Catalog No. 255 illustrates and explains features of a line of electrolytic carbide tool grinders. Included are chip breaker and cup wheel grinders, as well as new vises and grinding fixtures. Grinding ease, speed and diamond wheel cost reductions up to 90% are claimed for the equipment.

Phosphating Compound: 179

MACDERMID INC.—Technical Data Sheet No. 11 describes Metex Durafos No. 6, a dry iron compound designed to clean and phosphate steel, aluminum, zinc and cadmium in one operation.



say die-cast by Gibbs!

Before you give up — take another stab at it — Gibbs service is truly a cut above the usual. Service like our automatic, more accurate, faster production of zinc casting to 10 pounds, aluminum to 5 pounds. Complete service under one roof including tool room, machining, plating, painting and assembly.

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RUPERT DIE CASTING COMPANY

Henderson, Kentucky

For more information circle No. 61 on the Reader Service Card

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HYDRAULIC EJECTION
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From 9⅞" x 8" to 23¾" x 35½"
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Welded Steel Construction (Patented)—30% lighter than cast-iron boxes!
Write for 170 page D-M-E Catalog, listing complete data and prices—or call or write your nearest D-M-E Branch TODAY for additional information.
58-E

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TAPERED WALLS minimize distortion

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Plants: Berwick, Pa. • St. Louis, Mo. • Huntington, W. Va.

For more information circle No. 1 on the Reader Service Card

USEFUL LITERATURE

continued from page 53

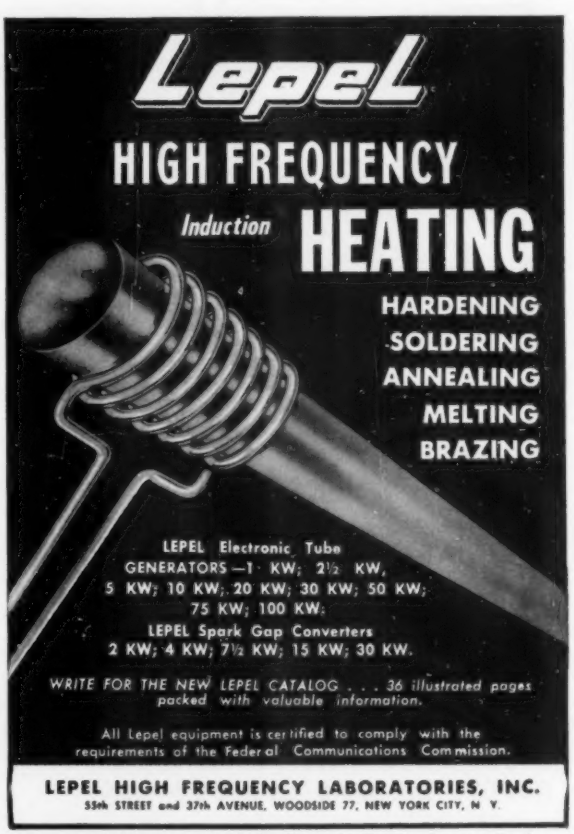
Power Press Catalog: 180
JOHNSON MACHINE & PRESS CORP.—Catalog covers the company's line of Flywheel and Back-geared Inclinable presses, Single and Double Crank straight side presses, Gap presses and Horn presses.

Spray Equipment: 181
ECLIPSE AIR BRUSH CO.—The company's complete line of spray equipment is presented in the "50th Anniversary Folder" which reviews and introduces many new products.

Mask Washing Machine: 182
CONFORMING MATRIX CORP.—A brochure describes a mask washing machine for cleaning large masks up to 42" in length. Model W-4200 has a greater cleaning capacity, but only requires 50 gallons of solvent for operation.

Metal Degreasing: 183
L. SONNEBORN SONS, INC.—Modern methods of degreasing metal surfaces are presented in Current Topics #132. The emulsion cleaners are presented in three groups: Stable, Two-phase, and Soak-type. The principles on which each type is based and their use is discussed.

Drilling & Tapping Catalog: 184
HYPNEUMAT INC.—Automatic drilling and tapping units, air or hydraulic powered, are illustrated and described in Bulletin No. 5810.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For more information circle No. 31 on the Reader Service Card

BURNS, BOARDMAN NAMED TO PURCHASING POST

Reginald R. Burns has been appointed director of purchases and William M. Boardman purchasing agent for OAKITE PRODUCTS, INC. Both men have been with Oakite for about 20 years.

NEW DEBURRING PLANT IN NEW JERSEY

A branch plant of the ULTRA-SONIC DEBURRING CO. has been opened in Union, New Jersey. The new plant is equipped with equipment for precise de-burring of metal parts requiring a high degree of accuracy. With ultra-sonic methods, parts can be completely de-burred, even microscopic burrs removed, radiused to any measurable amount, the surface improved and delivered chemically clean.

NEW AGENTS FOR CASTING SUPPLY HOUSE

Robert Greenbaum of CASTING SUPPLY HOUSE has announced the appointment of two new sales agencies to handle the company's complete line of supplies and equipment.

Wai-Met Alloys Co. will cover the Detroit area and Yates Mfg. Co. the Chicago area.

McMULLIN TO HEAD KAISER EXTRUSIONS

R. B. McMullin has been appointed extrusion product manager for KAISER ALUMINUM & CHEMICAL SALES, INC. He will make his headquarters at the company's general sales offices in Chicago.

LITEMETAL ADDS ZINC CASTING DIVISION

A separate division for the production of zinc die castings has been established by LITEMETAL DI-CAST, INC. Announcement of the new division was made by Robert C. Cornell, vice president. The addition of the zinc division makes this company one of the few commercial die casting concerns who regularly die cast zinc, aluminum and magnesium.

The new division will be housed in a separate building to avoid any possible metal contamination. The plant will be equipped with 400 and 600 ton machines, trim presses and vacuum equipment so that all types of work can be done.

One Source For

RUBBER ROLLS and CONTACT WHEELS

In sizes and coverings to do your job better at Less Cost

Rubber Rollers for all industries, including Guide Rolls, Pinch Rolls, Hold Down Rolls, Segmented Rolls, Coating Rolls, and Segmented Polishing Rolls—Highest quality materials and workmanship, competitively priced.

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Write today for Catalog and prices, or send blueprints for us to quote on. All inquiries promptly answered.

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For more information circle No. 57 on the Reader Service Card

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ON ECONOMICAL
COLOR
NOW OFFERS DECORATIVE
CHROMATES
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At long last you can now secure beautifully bright, gleaming colors from a simple LUSTER-ON chromate dip process for your zinc plated small parts.

These are not just spotty identification colors. These are scintillating golds, yellows, blues, greens, violets, reds, brass and copper hues that will add glamor and sales appeal.

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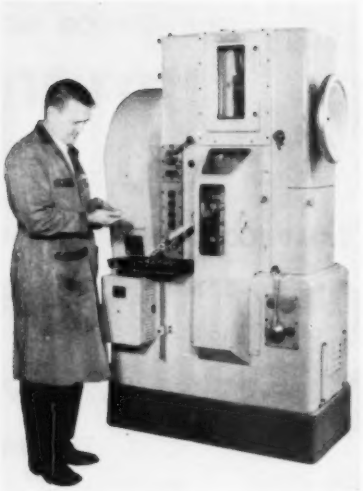
66 Waltham Ave., Springfield 9, Mass.

Circle No. 50 on the Reader Service Card

NEW PRODUCTS AND DEVELOPMENTS

Want complete details on these announcements? Use the Reader Service Cards. You'll find them facing page 40 of this issue



UNIVERSAL PRESS . . . for staking, sizing

A series of mechanical presses with a feeding mechanism that permits automatic operation and quick setup for secondary operations, has been introduced by HALLER, INC.

With the chain feed, parts are automatically dropped into carriers where they are transported to the die opening. After the operation, an ejection movement returns the parts to the carrier where they are then ejected down a chute in front of the machine.

Illustrated is a sizing operation. A shoulder bushing is fed down the long tube on the rear of the machine. When the feeder arms return to the back position, they have a cam which engages a damper. This permits one part to drop down into the carrier. This is adjustable allowing a variety of sizes to be handled with the same setup.

The bushing is then moved to the die where the ID, OD and length are sized, after which the parts are ejected. Speeds of up to 40 strokes per minute can be maintained.

Circle No. 205 on the Reader Service Card

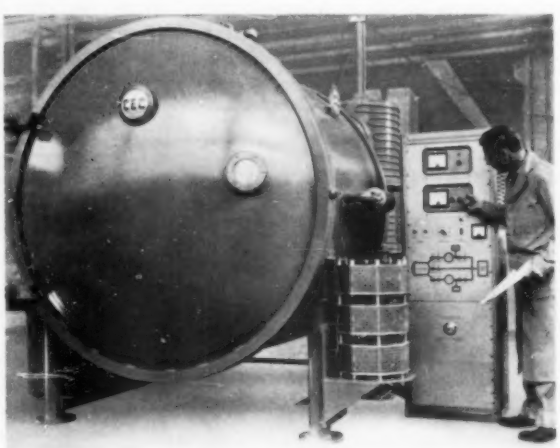
VACUUM COATER . . . holds work pieces up to 22" x 50"

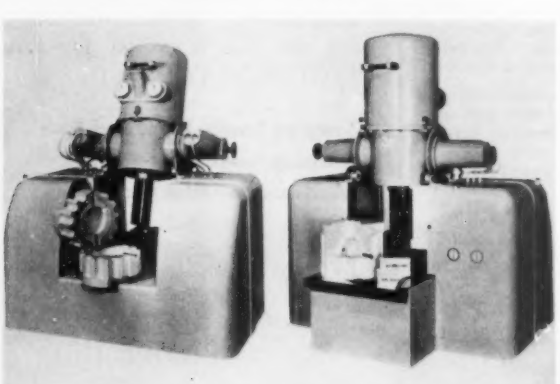
The LC1-72 is a 72" vacuum coater with six stations. It can hold work pieces up to 22 by 50 inches. Manufactured by the ROCHESTER DIVISION, CONSOLIDATED ELECTRODYNAMICS CORP., the coater has a pump down time of 5.5 minutes to reach a normal working pressure of 5×10^{-4} mm Hg. Operating range of the coater extends from 5×10^{-5} mm Hg to 2×10^{-3} mm Hg. A complete cycle, from insertion of the work pieces to removal of the coated item is 9 minutes.

Each of the six rotating stations has six removable work-holding rods that may be adjusted along the length of each spoke of the station fixture to working diameters of from 2 to 20 inches.

The complete vacuum cycle is semi-automatically controlled by a four-position indexing switch on the control panel. A lighted schematic diagram on the panel indicated valve position, providing a simple visual check of the unit's operation.

Circle No. 206 on the Reader Service Card





LOW COST FURNACE . . . has 15 lb capacity

The Clino "Argo-Vac" Production Vacuum and Argon Melting Furnace, introduced by BRITISH MACHINES & FOUNDRY SUPPLIES, LTD., has a 15 lb melting capacity.

The power supply and vacuum pump are enclosed in a compact cabinet while the furnace body, complete with electrode control housings sits across the cabinet and rotates on four rollers. The vacuum chamber is of the bell jar type and clamps on the furnace body.

The furnace features the long life, quick change "Zirconal" composite crucible. This provides slag-free pours.

Linings are changed by lifting out the composite unit and pulling the electrodes and removing the top flange.

Circle No. 207 on the Reader Service Card

continued on page 58

You get speedier service from the

ZINC ZONE

Central location of American Zinc plants assures prompt deliveries of slab zinc to any point in the nation.

HILLSBORO, ILL., PLANT
Prime Western, Brass Special, Intermediate, High Grade, Continuous Galvanizing Grades
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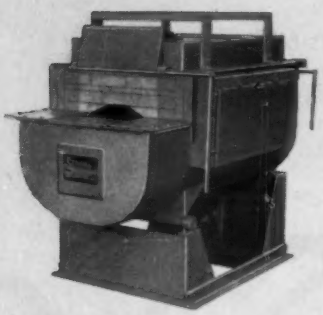
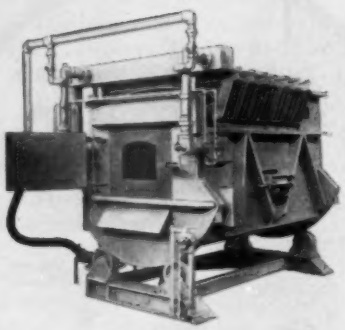
For more information circle No. 4 on the Reader Service Card

HEVI-DUTY adds STROMAN to its Fine Line of Furnaces



Electric Resistance Holding Furnace—Available in several capacities for holding molten aluminum for die casting and permanent mold work.

Reverberatory Furnaces — for breakdown of non-ferrous metals to supply hot metal to holding furnaces. Can be supplied with gas or oil or combination burners. Hydraulic tilting mechanism. Also available are double chamber furnaces for melting and holding in the same furnace.



Crucible Melting Furnaces — for brass, bronze, aluminum and other non-ferrous metals. Stationary or tilting may be tilted manually, hydraulically, mechanically, or by independent hoist. Wide range of sizes.

The Stroman Furnace and Engineering Company, manufacturers of non-ferrous metal melting furnaces and other foundry equipment, has been purchased by Hevi-Duty Electric Company.

The wide range of Stroman-designed foundry equipment will now be produced at Hevi-Duty's new Watertown, Wisconsin, plant. All Stroman equipment now in use will be serviced by Hevi-Duty. For more information, write Hevi-Duty Electric Company, Milwaukee 1, Wisconsin.

- Industrial Furnaces Electric and Fuel
- Laboratory Furnaces
- Dry Type Transformers
- Constant Current Regulators

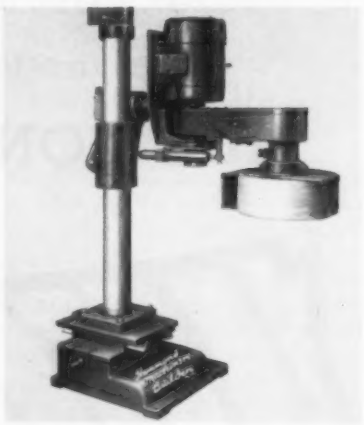
HEVI-DUTY ELECTRIC CO.
Milwaukee 1, Wisconsin

For more information circle No. 21 on the Reader Service Card

NEW PRODUCTS—

continued from page 56

FLOATING HEAD
. . . for polishing or buffing



A heavy duty floating type polishing or buffing head that is available with a 10, 15, or 20 HP motor and Multi-V-Belt drive, has been introduced by HAMMOND MACHINERY BUILDERS, INC. The head is suited for use on rotary automatic turrets or straight line conveyors where floating action on irregular shaped parts is required.

Circle No. 208 on Reader Service Card.

BARREL FINISHING EQUIPMENT
. . . is vibration-free

The Model 30 series of precision barrel finishing equipment manufactured by the TECHLINE DIV., WHEELABRATOR CORP., is characterized by vibration-free operation.

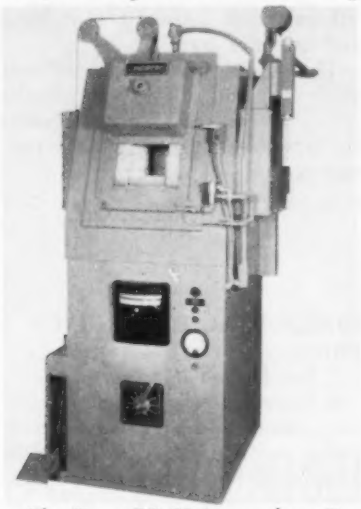
Other features of the series include: Molded fiberglass safety gate; full-opening doors on the cylinder; doors sealed by special cam locks.

The machines are offered in 20 models ranging from 5 to 30 cu. ft. capacity.

Circle No. 210 on Reader Service Card

BOX FURNACE

. . . for heavy and continuous duty



The Type GB-50 Atmosphere Box Furnace, manufactured by LINDBERG ENGINEERING CO., is designed for heavy and continuous duty at all heat levels up to 2500 F., or short runs to 2700 F. Heating elements are of the non-metallic silicon carbide type. The unit has a clear working area of 6″ wide x 12″ deep x 5″ high and is supplied complete with all components prewired and piped.

Circle No. 209 on Reader Service Card

OLIVE DRAB COATING

. . . for cadmium

The CHEMICAL CONVERSION CORP., has introduced Kenvert No. 11-PC, an olive drab coating for cadmium, in powder form. The powder provides maximum corrosion protection and meets the requirements of Spec. QQ-P-416, Type 2. It may be dyed black or a variety of colors for coding purposes. Because it's a powder, furnished in a nonreturnable package, it is shipped at lower freight rates, providing a cost savings.

Circle No. 212 on Reader Service Card

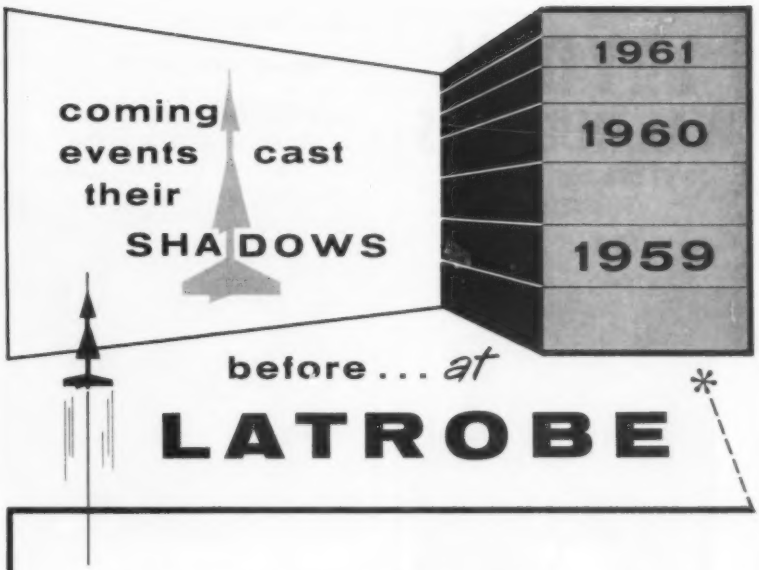
NEW LUBRICANT

. . . for plunger tips

Plunger Lube Lite, a dark colored adhesive viscus material, that will flow at room temperature, has been introduced by the I. D. CORPORATION. The lubricant will not thin out, and remains adhesive when applied to the hot tip. It remains wet and yet does not allow the fluid flow to by-pass into the casting runners or onto the castings.

Circle No. 214 on Reader Service Card

Continued on page 60



Months and months ago, Latrobe produced intricate parts and shapes for many new products scheduled in 1959 and the years beyond . . .

Long before these designs of "things-to-come" were completed on the drawing boards, those behind the products had turned to Latrobe! For they knew from past experiences and performances, Latrobe has the facilities to produce quality Die Castings!

Furthermore, they knew Latrobe maintains modern testing, development and research laboratories, manned by qualified metallurgical engineers dedicated to technology, whose specialty is to meet the precise physical and characteristic requirements of the specifications!

Finally, they knew the Latrobe reputation for workmanship, service and economy whether on small or large quantity production runs.

Send for your copy of "Latrobe Castings" on your letterhead. It tells the inside story why L.D.C. Aluminum, Zinc and Lead Die Castings sparkle the 1959 new product parade!

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Tel: Baldwin 4-3523

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Tel: Trinity 3-5910

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***Latrobe Die Casting Co.**
Latrobe, Pennsylvania

Established 1918

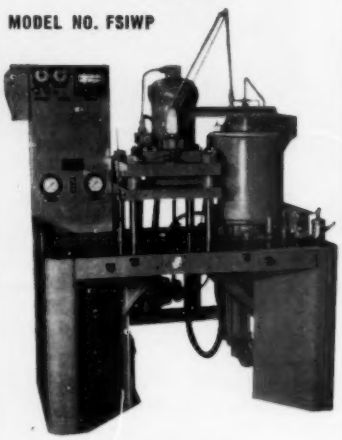
To Make the Best — Begin with the Best Castings!

For more information circle No. 32 on the Reader Service Card

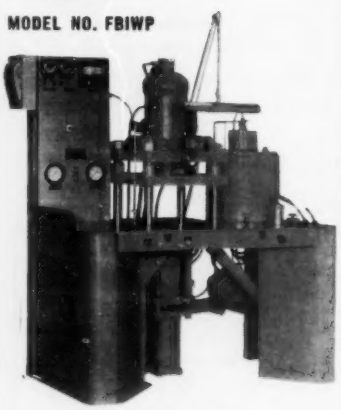
LEYDEN
WAX INJECTORS

3 OF OUR MOST POPULAR MODELS

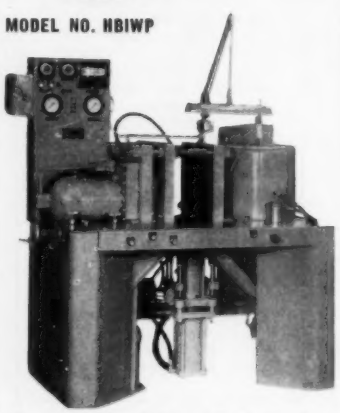
MODEL NO. FSIWP



MODEL NO. FBIWP



MODEL NO. HBIWP



For complete details see the September, October and November issues of Precision Metal Molding.

Any Type or Size Unit Built to Your Specifications.

LEYDEN HYDRAULICS, INC.

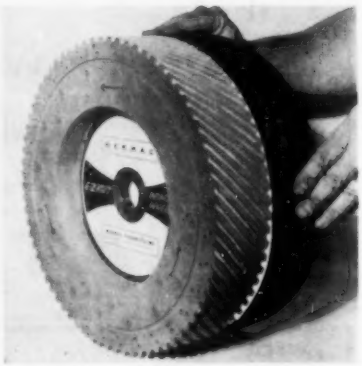
1800 North River Rd. • Melrose Park, Ill.

Circle No. 27 on the Reader Service Card

continued from page 59

GRINDING WHEEL

. . . replaces backstand-idler



The Mermac Wheel is an expanding type grinding and polishing wheel made of rubber and using coated abrasive bands. The wheel, manufactured by MERMAC PRODUCTS, INC., is composed of metal hubs to which rubber is molded, eliminating the need for backstand-idlers. The abrasive band is fitted loosely around the wheel while at rest. When the wheel is brought to operating speed, centrifugal force causes it to expand and grip the band.

The wheels, which are offered as replacements for contact wheels, set-up wheels, and bonded grinding wheels, feature a superior cutting power.

Circle No. 213 on Reader Service Card

HORIZONTAL HYDRAULIC PRESS

. . . has bottom injection

A horizontal clamp bottom center injection machine that features better venting of molds, has been introduced by LEYDEN HYDRAULICS, INC. Self-contained, the unit has two hydraulic pumps, one for clamping and one for injection. Both are adjustable to deliver clamping pressure up to 20 tons, and injection pressure of 50 psi to 2000 psi.

The unit measures 37″ x 63″ x 74″, and weighs approximately 2500 pounds.

Circle No. 27 on Reader Service Card

another unique **GRC die cast** zinc alloy component

this movable Intercast® element unit was cast-assembled in one operation by GRC

GRC's unique, patented INTERCAST method die casts multiple-part zinc-alloy units with moving elements in a single, automatic, time-saving, money-saving operation . . . even continuously interlocked assemblies. Units leave the machine complete, ready for immediate use.

This INTERCAST technique is an ingenious refinement of GRC's exclusive method of small parts die casting—providing broad design latitude, close tolerances, economies in quantities of 100,000 and more.

Let GRC solve your problems. No size too small. Maximum length: 1¾", maximum weight: ½ oz.

Send for fact-filled bulletin, TODAY.

World's Foremost Producer of Small Die Castings

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For more information circle No. 18 on the Reader Service Card

The Continuous Casting of Aluminum Alloys

By NORMAN GOSS*

CASTING ingots, or billets, in static molds gives an undesirable metallurgical structure in some metals and alloys. In almost every case it gives a coarse structure that must be broken-up by heavy reduction in hot mills. The non-ferrous metals, particularly aluminum and its alloys, tend to show massive segregation when statically cast, and this leads to cracking and other troubles during subsequent rolling.

Impurities such as oxides, slag and dross must be eliminated to produce sound ingots. Where the rate of cooling is slow enough, impurities will segregate and collect in the center of the ingot, and rise to the piped end. This piped end must be removed and represents waste.

All of these defects increase the cost of the end product due to the high scrap losses. All of these defects can be eliminated or greatly minimized through the use of continuous casting. For the extrusion industry, particularly impact extrusion, it is most important that the billets be clean, free of segregation and internal cracks, and that they have a fine, uniform grain structure, and a good surface. Continuous cast metals can have all of these desirable characteristics.

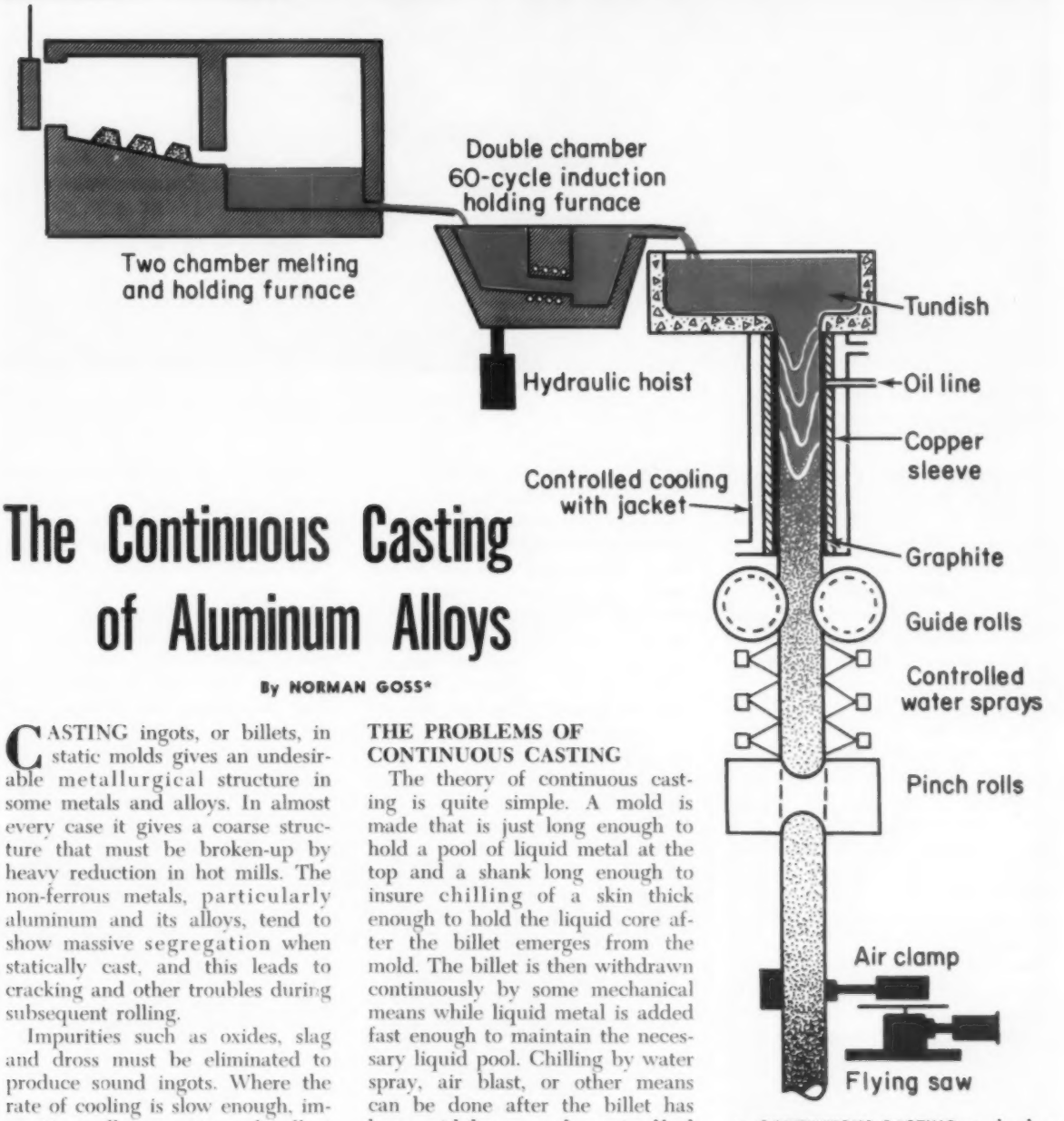
*METALLURGICAL CONSULTANT

THE PROBLEMS OF CONTINUOUS CASTING

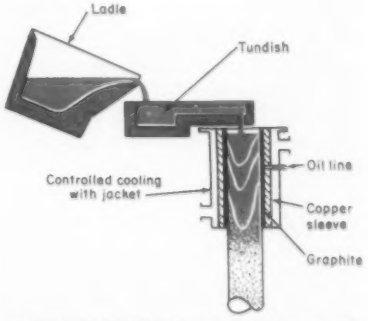
The theory of continuous casting is quite simple. A mold is made that is just long enough to hold a pool of liquid metal at the top and a shank long enough to insure chilling of a skin thick enough to hold the liquid core after the billet emerges from the mold. The billet is then withdrawn continuously by some mechanical means while liquid metal is added fast enough to maintain the necessary liquid pool. Chilling by water spray, air blast, or other means can be done after the billet has been withdrawn and controlled cooling for many alloys is necessary to prevent cracking. There's only one catch to this simple scheme, that is friction between the chilled billet and the mold wall. The tensile strength of the billet as it emerges from the mold is very low and care must be used to keep from pulling the billet apart or to prevent it hanging in the mold. This is a problem in lubrication.

Over the past 100 years, more than 3000 patents have been issued on continuous casting. The majority of these patents have been aimed at overcoming mold wall friction, mold design and pouring means and chill rates.

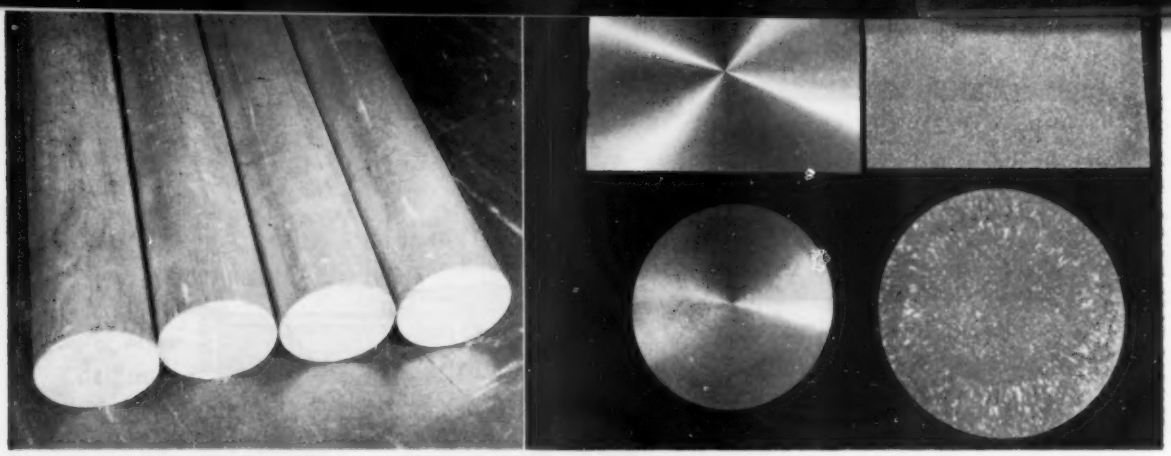
But proper lubrication has an-



1 CONTINUOUS CASTING can be done with a set-up like this. Billet length depends only on a continuous supply of molten metal. Cut-off length is for customer preference.



2 POURING FROM A LADLE is an alternate method to casting from a holding furnace.



3 ULTRA SMOOTH SURFACE on the billet is one of the characteristics of this method of continuous casting. By control of the rate of pouring and cooling the as-cast structure can be made as fine or as coarse as desired.

other function than to reduce wall friction. It prevents minute amounts of oxide skin from sticking to the mold wall and causing a hang-up. The lubricant also improves the billet surface.

Another serious problem in continuous casting is the rate of cooling. To secure a shell of adequate strength, the billet surface must be cooled fast enough to give a fairly thick skin. But, if the cooling rate is too fast, the skin will be highly stressed, leading to cracking and distortion. If the rate of cooling is too slow, excessively large grains will develop, low melting point constituents will sweat out, and the chilled skin will be so thin that it will rupture on withdrawing from the mold.

Another major problem in continuous casting is to prevent the formation of oxides during pouring and to pour in such a manner that turbulence does not develop. The first of these problems can be solved, or minimized, by a protective atmosphere around the stream of molten metal—a so-called "pouring sock." With the proper atmosphere even aluminum can be poured so that a continuous film of oxide is formed and clean, molten metal runs from the ladle into the mold without the formation of more oxide.

Prevention of turbulence, is solved best through the use of a tundish with a stopper to control the rate of metal flow into the mold head. Any turbulence caused by pouring is quieted in the tundish so that a viscous flow of metal is secured into the mold. This system avoids the formation of oxide, dross, or slag in the already purified aluminum.

HOW IS CONTINUOUS CASTING DONE?

One of the best methods for the continuous casting of extrusion billets in the smaller sizes and in particular for impact extrusion is by the Apex-Goss process (U. S. Patent 2,747,244). With this process, aluminum alloys can be continuously cast for as long a time as may be desired. The cast bar (of any desired cross sectional shape) has a fine, uniform grain structure, is held accurately to dimensions, and has a superior surface.

Chances of inclusions are minimized, there are no cracks, either internal or external, and the surface is free of stresses. The secret of the process lies in the mold and the method of its lubrication.

MOLD DESIGN

The mold consists of a thin, porous graphite sleeve having a high thermal conductivity. A thin walled copper sleeve is either pressed or shrunk around the graphite so that there is good thermal contact between the two. A second jacket surrounds this assembly with a space between the two sleeves for water, or the mold may be sprayed directly. This assembly is shown in Figure 1. Control of the rate of chill and the thickness of the chilled skin is secured by the temperature of the coolant and by the length of the cooling zone.

The mold is lubricated with oil such as SAE 20, rape seed oil, castor oil, paraffin oil, or palm oil. Of these, palm oil mixed with SAE 20 mineral oil or with rape seed oil have given the best results.

The oil is fed to the porous graphite liner from a storage tank. A manifold connects the graphite so that oil can be introduced in a number of places. In some cases, a very shallow groove is cut into the graphite and acts as an oil distributor. The rate of flow through the graphite will depend on a number of factors such as the porosity of the mold, the oil pressure (pressure may vary from less than 1 psi to about 50 psi), thickness of graphite liner, etc. To make sure that the entire inside surface of the mold is covered with an oil film, shallow scratches may be made along the surface of the mold, to assist capillary action. When the mold is in operation a combination of oil pressure and capillary action maintains a thin uniform film of oil on the inner mold surface.

No general rules can be given for the amount of oil or the specific type to use. Both of these will vary with the rate of casting and with the type of alloy being cast.

MOLD LENGTH

Mold length is determined by the alloy and by the casting speed. Since a completely lubricated mold is used, the destructive frictional drag is eliminated. A long mold section to provide thorough chilling can then be used. This allows much faster casting rates, and controlled cooling of alloys with a wide freezing range.

STARTING THE CASTING

A starting bar must be used at the beginning of the casting operation. This bar is placed from 2″ to 4″ below the top of the mold. As soon as liquid metal start contacts the chill surface of the mold, oil sweats out, forming a non-wetting layer on the mold. Because of the oil film the friction between the starting bar and the mold wall is low so that the pinch rolls can pull

the casting through the mold.

PINCH ROLLS

Some means must be provided to draw the casting through the mold at a steady and controlled rate. Pinch rolls are the best for this job. The rolls are positioned below the mold and are accurately lined up with the bore. As the starting bar, and later the billet, come out of the mold they are seized by the pinch rolls which continuously guide billet through mold. The speed of the rolls controls the rate of casting and must be maintained constant, once set. Small variations are within the control of the operator so that he can make needed adjustments.

CONTROL FACTORS

Control of continuous casting is secured by these factors.

1. Metal Temperature: Once a casting cycle has been established, the casting temperature must be carefully controlled. Too high a temperature will lead to a thin chilled skin with necking down, hanging, and slow casting as a result. Too low a temperature will give an undesirable metallurgical structure, and poor surface.
2. Pouring Rate: If too fast a pouring-rate is used, there may be excessive turbulence in the liquid metal and dirty bars will result. Also the rate of withdrawing must be increased and this can result in a thin chilled skin with resulting casting failure. Too slow a pouring-rate simply slows down the casting operation.
3. Amount of Lubricant: Careful adjustment of the amount of oil is needed. It must be applied continuously, and uniformly over the entire mold surface, in order to properly control friction. If too much lubricant is used there will be excessive fume formation and this can lead to porous castings.

CONTROL OF SURFACE

For all extrusion work, and particularly for impact extrusion, it is desirable to have billet surfaces as smooth as possible. This is particularly important in the impact extrusion of heavier working parts such as pistons, fractional horse-

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CONTINUOUS CASTING

power motor housings, certain ordnance and airplane parts, pole line hardware and the like. Expensive scalping of billet surfaces is entirely unnecessary on billets produced by the Apex-Goss process.

The proper amount of lubricant forming a continuous, thin film between the mold and the metal also contributes to a better finish. And finally the oil and oil vapor act as a protective atmosphere to prevent surface oxidation. With proper control and in a well machined graphite mold, billets cast by the Apex-Goss method emerge with a fine, smooth surface that is entirely free of folds, cold shuts, inclusions, and other defects.

BILLET CUT-OFF

One advantage of continuous casting is that the billets can be any desired length. The continuous casting method described includes a flying cut-off saw. When the billet reaches the desired length the saw starts a cut and progresses with the billet until the cut is completed. The saw then returns to its starting point. This is all automatically controlled.

DIMENSIONAL CONTROL

Because of the precise control that is possible in continuous casting, it is possible to maintain close dimensions. As an example, on a 2″ diameter bar the total variation over an eight hour casting-run was less than 0.003″.

CONTINUOUS CAST BILLETS FOR IMPACT EXTRUSIONS

Due to the fine grained, heterogeneous structure of Apex Goss billets the problem of gross dendritic structure with the attendant difficulties in impact extrusion does not arise. For this reason, more plastic deformation can be given the as-cast metal and maximum work hardening can be secured.

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continued on page 70

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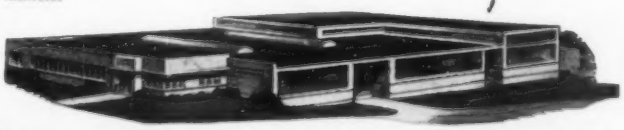

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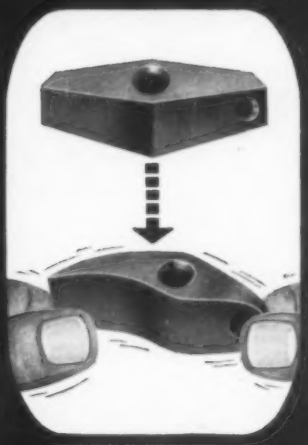

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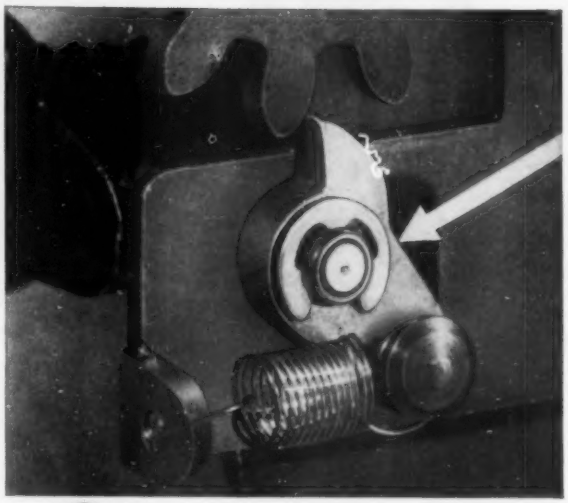

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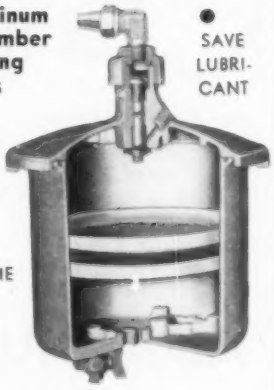

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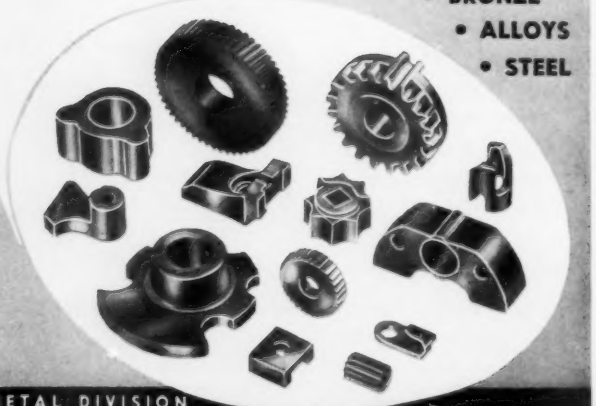

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NEW OFFICERS FOR AJAX ENGINEERING

AJAX ENGINEERING CORP., one of the pioneer companies in induction heating and melting has announced new corporate officers.

Dr. G. H. Clamer, formerly president, has been elected chairman of the board. Manuel Tama becomes the new president, moving up from his former position of vice president and general manager. Mario Tama, secretary and research engineer

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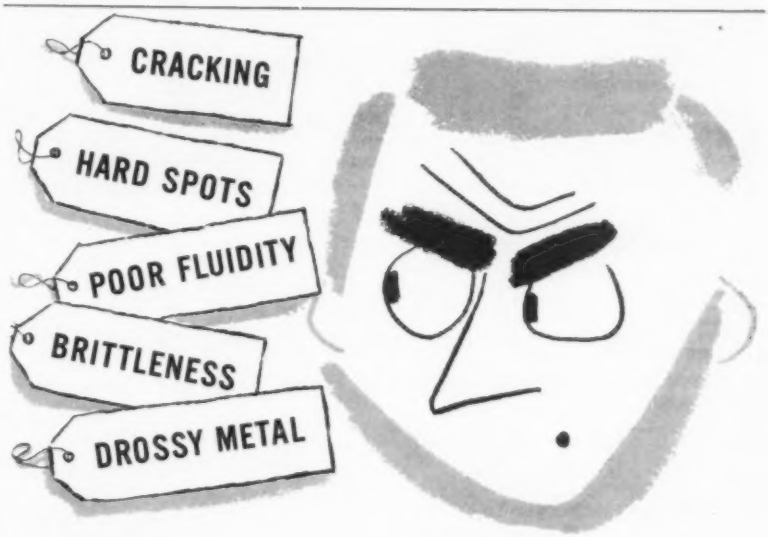


...Rejects knocking your profits for a loop ?

The alloys you're using may be at fault —

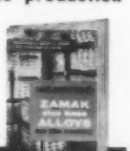
- **Do they actually meet specifications?**
- **Do your casters have to "make allowances"?**
- **Is the Inspection Department working "overtime"?**

Then it's time to be sure!

For good casting results your alloys must fulfill a considerable number of specific requirements. For instance, good fluidity to reproduce fine detail, fill out thin sections; stable properties to yield good surface texture, provide adequate mechanical strength; **plus** all the particular qualities to meet **your** casting needs.

See how HB&S start-to-finish quality controls save you time and money . . . help to eliminate rejects . . . guarantee your alloys always 100% "on spec."

Write TODAY for Henning's ALL-NEW "Reference Book and Guide on Zamak (Zinc Base) Die Casting Alloys". It gives valuable production and design data for die casters and engineers . . . and it's yours for the asking.



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Process observation, alloy additions, pouring, temperature and process readings, high frequency control, valve sequencing—all focus around one center of operation.

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a high-vacuum furnace for lab and pilot plant

CEC's 5 to 50 pound melting and casting furnace offers:

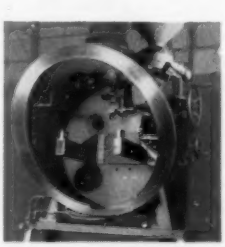
Three-way casting: Melts of 5, 12, 17, 30, or 50 pounds can be cast in single or multiple molds—or (with adaptation) centrifugally.

Ease of materials handling: All parts of the furnace interior are within arm's reach. The oblique angle flange connecting the stainless steel chamber sections provides unusual vertical clearance for removing molds directly. A deep water-cooled mold well provides 33" under the crucible lip for pouring bar-type ingots. Electric feedthroughs are provided for mold heating.

Complete controls: The basic furnace includes a manual bridge-breaker, a feeder and alloy cup mechanism, and a nonfogging sight tube for optical pyrometry. Pneumatic line valves are interlocked and controlled from central panel for safe, sure operation. It's easy to add a sampler, thermocouple, and equipment for semi-continuous operation.

Ample pumping: A 2-stage diffusion-ejector pump quickly brings the compact system to the low micron pressure range, with ample reserve capacity to handle gas loads generated by alloy additions, deoxidation, and pouring.

Write for illustrated Bulletin 4-30, which lists complete specifications, accessories, and design features of this remarkably versatile furnace.



Interior view of compact furnace shows alloy addition devices and crucible trunions.

Consolidated Electrodynamics

Rochester Division, Rochester 3, N. Y.

SALES AND SERVICE OFFICES IN PRINCIPAL CITIES

For more information circle No. 12 on the Reader Service Card

since 1942 becomes the new vice president.

POWDER METALLURGY PARTS GROUP HAS NEW DIRECTORS

Three new members were named to the board of directors of the POWDER METALLURGY PARTS MANUFACTURERS ASSOCIATION at the second annual meeting in Pittsburgh.

The directors, elected for a three year period, are: P. J. Failla, Johnson Bronze Co.; W. L. Strawbridge, Sr., Precision Metal Products Co.; and R. L. Pettibone, Easton Mfg. Co.

Mr. Failla will also serve as chairman of the Technical Committee according to K. M. Gleszer, PMPMA president.

HARBISON-WALKER APPOINTS WILSON VICE PRESIDENT

The board of directors of the HARBISON-WALKER REFACTORIES CO. has announced the appointment of A. Brent Wilson as executive vice president. Mr. A. L. Garber will remain as president.

CONTINUOUS CASTING

continued from page 65

produced, but a beginning has only been made. The automobile, aircraft and appliance industries are giving this new method serious consideration. For example, aluminum pistons will probably be impact extruded in quantities in the near future. An extruded piston has all of the desirable characteristics of a cast piston and many additional advantages. The cost of manufacture is lower, there are fewer rejects both before and after machining, the amout of machining needed is less. Also extruded pistons are lighter than cast ones because of their higher strength they can be made with thinner walls.

While the most promising immediate use for impact extruded aluminum parts, in large numbers, is for pistons; there are many other parts that today are made as either castings or forgings that could be converted to impact extrusions with a material reduction in costs, and with improved physicals.

ACKNOWLEDGMENT—The author wishes to acknowledge help received in the preparation of this manuscript from Don Colwell, Vice President, Apex Smelting Company, and John Hall, Superintendent, Continuous Casting Division, Apex Smelting Company.

OPPORTUNITIES

jobs & equipment

Opportunities rates: $20 for the first column-inch; $15 for each additional column-inch payable in advance. To answer box number advertisements, address responses to the box at Precision Metal Molding. 812 Huron Rd., Cleveland 15, Ohio. Closing date: 1st day of month preceding publication.

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Midwest concern seeks a design engineer experienced in die casting machine design, or die cast plastic molding machine design. Must be capable of assuming responsibility for heading up the project of designing and guiding of product. This man should know application work with die casting machinery. Excellent salary. Forward resume to Box No. 12158, Precision Metal Molding.

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1 Lindberg-Fisher Two-Chamber Induction Melting Furnace. Type IM-RR501S; Serial 9339; 50 KW; 440/1/60 for aluminum. Complete with control panels; pyrometer etc. Good condition. Price $1500.
1 Govro-Nelson Drilling Machine. Standard Round Table Type With Six KH Drilling Units. With 220/3/60 motors. Excellent condition. Price $1750.
Reply to: H. D. Songer, P. O. Box 295, Fairfield, Illinois. Telephone 2-3041.

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1 Lindberg Fisher electric induction melting furnace — complete with all controls and recording equipment. Serial #11789 Type IM-R301S, 440 V 30KW. Price $3,000.00. Box No. 12258.

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S-W-I-S-H! One pressure whisks mold clean with powerful air jet. S-W-I-S-H! Further pressure on same lever shuts off air and lubricates.

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FIRST in commercial production and sale of zinc base die casting alloy ingot containing 4% aluminum made from high grade zinc. Production started October, 1924.

FIRST to use 99.99 plus pure zinc when it became available in 1928.

FIRST to develop the lower magnesium contents, .03 to .05%, which eliminated the hot shortness characteristics experienced with .10% magnesium and at the same time was sufficient to prevent the intercrystalline corrosion. Apex promoted in 1931 the first ASTM specification written for zinc base die casting alloys.

FIRST to establish and publish information on the effects of metal and die temperatures on different alloy compositions through actual die casting of thousands of test bars. Apex "Metalgrams" showing these effects were initiated in 1931 and continued through 1945.

FIRST to use large capacity refractory lined furnaces for alloying, replacing the conventional iron metal pots. The larger heats established a uniformity of composition not previously attainable. Iron pickup also was eliminated.

FIRST to employ Quantometers—direct reading spectrographs—for rapid and accurate control of alloy composition.

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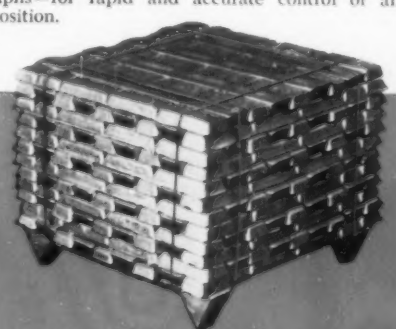

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